

Multi-Jurisdictional All-Hazards Pre-Disaster Mitigation Plan

FOR



Grand County

SITUATED WITHIN THE

State of Colorado

ADOPTED BY THE GRAND COUNTY BOARD OF COUNTY COMMISSIONERS
RESOLUTION 2008-6-31
JUNE 17, 2008

Grand County, Colorado
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Plan Approved: Pending

This Plan encompasses the Colorado jurisdictions of:

Grand County, Colorado
Unincorporated Grand County
Town of Granby
Town of Hot Sulphur Springs
Town of Fraser
Town of Grand Lake
Town of Kremmling
Town of Winter Park

This Pre-Disaster Mitigation Plan represents the work of Grand County and the city and towns participating as its partner in this important undertaking. The following report encompasses the best efforts of the plan's participants to comply with guidance from the State of Colorado, Division of Emergency Management, and the Federal Emergency Management Agency. While it is believed to be fully responsive to the requirements of the state and federal governments, it is understood and acknowledged by all participants that the disaster mitigation planning process is dynamic and requires periodic review, analysis, and amendment.

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Introduction

Natural hazards such as wildfire, lightning, high winds, avalanche, and severe winter storms are normal aspects of Colorado's rugged mountain country. These and other natural hazards have historically often impacted daily life in Grand County, Colorado. Today, human-caused hazards like technology failures and terrorism add a different dimension to the threats faced not only in Grand County, but throughout Colorado and across the nation. To assist Grand County in reducing the impact on safety, property and critical infrastructure caused by these disparate hazards, Grand County and its incorporated jurisdictions (sometimes collectively referred to herein as 'Grand County') are updating and supplementing their emergency planning efforts through development of the Pre-Disaster Mitigation Plan ("PDMP" or the "Plan"), which follows.

A requirement of such a plan is that each jurisdiction included in and requesting approval of the plan must document that it has been formally adopted. In this case, the communities listed in the table on page 7 have actively participated in the Plan development and have adopted the Plan along with Grand County.

In conjunction with these communities, Grand County has previously implemented formal and informal joint emergency response initiatives that have provided benefit to Grand County residents. The County and these communities, therefore, have elected to develop a multi-jurisdictional Pre-Disaster Mitigation Plan designed to leverage its common characteristics and planning resources, and to better prepare for the many natural and manmade hazards the community faces.

DISASTER MITIGATION ACT OF 2000

To better protect the Nation from disasters, especially those considered to be naturally occurring ones, the U.S. Congress passed the Robert T. Stafford Disaster Relief and Emergency Assistance Act, enacted as the Disaster Mitigation Act of 2000 (DMA 2000). With this legislation, the Federal government has placed renewed emphasis on pre-disaster mitigation of potential hazards. Most relevant to state and local governments under the DMA 2000 are its amendments to Sections 203 (Pre-Disaster Hazard Mitigation) and 322 (Mitigation Planning).

Section 203 of the DMA 2000 establishes a "National Pre-Disaster Mitigation Fund" to support a program that will "provide technical and financial assistance to state and local governments to assist in the implementation of pre-disaster hazard mitigation measures that are cost-effective and designed to reduce injuries, loss of life, and damage and destruction of property, including damage to critical services and facilities under the jurisdiction of the state or local governments."

Section 322 of the DMA 2000 provides a new and revitalized approach to mitigation planning by:

- Establishing a requirement and delivering new guidance for state, local, and tribal mitigation plans;
- Providing for states to receive an increased percentage of Hazard Mitigation Grant Program (HMGP) funds (from 15 percent to 20 percent) if, at the time of the declaration of a major disaster, they have in effect an approved State Mitigation Plan that meets criteria defined in the law; and
- Authorizing up to seven percent (7.0%) of the HMGP funds available to a state to be used for development of state, local, and tribal mitigation plans.

Grand County Pre-Disaster Mitigation Plan

Grand County applied for and received funds from the State of Colorado to support development of this Pre-Disaster Mitigation Plan and to comply with the DMA 2000. Through the leadership of the Emergency Management Coordinator and a voluntary team of Grand County emergency professionals and County residents, a common plan for their county, and incorporated towns therein, has been prepared. This Plan, as described herein, is known as the Grand County Pre-Disaster Mitigation Plan.

PURPOSE, GOALS AND OBJECTIVES

The purpose of the Plan is to:

- Protect life, safety, and property by reducing the potential for future damages and economic losses that result from natural and human-caused hazards;
- Support future grant requests for pre- and post-disaster initiatives;
- Speed recovery and redevelopment following future disaster events;
- Demonstrate Grand County's commitment to hazard mitigation principles; and
- Comply with federal and state legislation and guidance for local hazard mitigation planning

The critical element of the Plan is a set of recommended pre-disaster mitigation actions that minimize or help reduce the potential negative impacts caused by the prioritized hazards. Specific goals and objectives have been established to deliver measurable benefits to the County through mitigation actions that have been justified and prioritized using accepted practices and the methodology described in this document. Grand County and its participating cities, towns and villages have formally adopted this Plan and established a process to periodically evaluate and modify its goals, objectives, and mitigation actions as part of ongoing Plan maintenance.

SCOPE OF THE PLAN

The Plan is focused on those hazards determined to pose high and moderate risk as indicated by Grand County's risk assessment. Priority is given to hazards with greater potential to affect health and safety, impact emergency response capability, or create distress to property and critical infrastructures within Grand County.

Grand County carefully considered a variety of natural hazards and human-caused threats pursuant to the compilation of this plan, and the hazards and mitigation actions detailed herein are those prioritized by the County and its plan partners. Future iterations of the Plan will re-evaluate hazards and, if appropriate, prioritize new hazards and develop associated potential mitigation actions documented in updated versions to the Plan.

PROJECT PARTICIPANTS

The Plan leveraged the various skills and interests associated with the participating jurisdictions. The Plan was developed by a multi-disciplined group consisting of emergency planners and responders, local government officials, and other subject matter experts within the private and public sectors. Project participants represented Grand County and the respective jurisdictions which adopted this Plan. Residents within Grand County actively contributed to Plan development by participating in the risk assessment and by providing valuable input to the draft Plan. Subsequent versions of the Plan will seek to include an even broader set of stakeholders while continuing its focus on public participation. Grand County, its participating jurisdictions, and agencies provided important contributions to the Plan, and, where appropriate, the Plan distinguishes information unique to each jurisdiction.

Grand County Pre-Disaster Mitigation Plan

AUTHORITY

The Plan is developed in accordance with current state and federal rules and regulations governing local hazard mitigation plans, including:

- Section 322, Mitigation Planning, of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, as enacted by Section 104 of the Disaster Mitigation Act of 2000 (P.L. 106-390);
- FEMA's Interim Final Rule published in the Federal Register on February 26, 2002 at 44 CFR Part 201; and
- The State of Colorado, Division of Emergency Management, Office of the Governor.

The authorities for jurisdictions participating in this Plan have adopted the plan effective as of the dates shown in the following tables.

Grand County PDMP Adoption Schedule		
Jurisdiction	Adopting Authority	Plan Adoption Date
Grand County	Board of County Commissioners	Pending
Fraser	Town Council	Pending
Granby	Town Council	Pending
Grand Lake	Town Council	Pending
Hot Sulphur Springs	Town Council	Pending
Kremmling	Town Council	Pending
Winter Park	Town Council	Pending

The Plan will be monitored and revised periodically in accordance with legislation and rules covering mitigation planning and as described in a subsequent section of this document.

PLAN ORGANIZATION

The Plan follows a format consistent with those adopted by FEMA and the State of Colorado. The Plan includes sections covering:

- Introduction
- Project Planning and Methodology
- Community Profile
- Risk Assessment
- Hazard Mitigation Strategy
- Plan Maintenance and Adoption
- Appendices

Project Planning and Methodology

This section describes the hazard mitigation planning process undertaken by Grand County to develop the Plan and create the framework for continuous Plan improvement. Grand County and its towns are subject to different human-caused and natural hazards which share a similar geography, demographics, and economic base. As a result, Grand County has implemented this planning methodology using a process based on widely recognized best practices, guidance from FEMA and the Colorado Division of Emergency Management, and input from the private sector and Grand County's respective constituents and emergency services professionals. Topics in this section include:

- The planning team and the project charter process
- Plan coordination and team meetings
- Hazards identification and prioritization
- Risk determination and impact on critical infrastructure
- Identification and selection of mitigation strategies
- Implementation of mitigation strategies
- Plan maintenance and updates

This Plan is developed to meet requirements under the Disaster Mitigation Act of 2000 (DMA 2000). Although the DMA 2000 mandates mitigation planning for natural disasters only, state and local planners are encouraged to include manmade hazards such as HAZMAT and terrorist issues into its planning model. Grand County understands that planning for human-caused hazards will also serve to increase overall preparedness, and an *all-hazards approach* is encompassed by this Plan.

THE PLANNING TEAM

Project participants

This Plan is developed using input from a cross-functional set of project participants representing Grand County. Notwithstanding the expertise available, Grand County recognizes that the dynamic nature of this project and targeted project deadlines require additional planning resources. With funding through the Colorado Division of Emergency Management, Grand County selected The Infrastructure Protection Group, LLC and Coalfire Systems, Inc., companies with specialties in risk management and emergency planning, to provide planning guidance and prepare the draft Plan based on input from the project participants.

As listed in the following tables, the project planning team consists of individuals representing Grand County and their respective communities who have adopted this Plan. The project approach is constructed to involve community residents, community officials, (including emergency response professionals), and representatives from the private sector. The planning team considered guidance from FEMA and interviewed a variety of stakeholders about possible project participants. As this planning process continues, Grand County intends to broaden participation to improve plan quality.

Grand County and Participating Jurisdictions	
Project Participant	General Project Role
Grand County	
Emergency Manager Grand County	<ul style="list-style-type: none"> • Grand County Project Manager and sponsor for, and attendee of, regular project meetings • Coordinate subject matter expertise on mitigation planning • Review and approve public survey • Coordinate hazard identification and prioritization • Coordinate identification of critical infrastructure • Support the risk assessment and identification of mitigation options and recommendations • Collection of existing emergency and mitigation plans • Coordinate public hearings for plan review
County Manager, Grand County	<ul style="list-style-type: none"> • Review draft documents
Director, Geographical Information Systems, Grand County	<ul style="list-style-type: none"> • Attend and support project kickoff meeting • Provide land use information as available
Director, Planning, Grand County	<ul style="list-style-type: none"> • Attend and support project kickoff meeting • Review and revise draft plans • Provide planning information as available
Director Public Health Nursing, Grand County	<ul style="list-style-type: none"> • Attend and support project kickoff meeting • Mitigation action input • Review and plan input
Director, Road & Bridge Department, Grand County	<ul style="list-style-type: none"> • Attend and support project kickoff meeting • Provide hazard identification and analysis support • Analysis of hazard mitigation actions
Sheriff, Grand County	<ul style="list-style-type: none"> • Provide hazard identification and analysis support • Analysis of hazard mitigation actions • Review draft documents
EMS Chief, Grand County EMS	<ul style="list-style-type: none"> • Provide hazard identification and analysis support • Analysis of hazard mitigation actions • Review draft documents
President, Grand County Search & Rescue Group	<ul style="list-style-type: none"> • Review draft documents
Attorney, Grand County	<ul style="list-style-type: none"> • Review draft documents
Local Emergency Planning Committee, Grand County	<ul style="list-style-type: none"> • Attend and support document release to entities for review and approval • Review of draft documents
Town of Kremmling	
Manager, Kremmling	<ul style="list-style-type: none"> • Project planning and approval • Review draft documents
Chief, Kremmling Police Department	<ul style="list-style-type: none"> • Review draft documents
Fire Chief, Kremmling Fire Protection District	<ul style="list-style-type: none"> • Provide hazard identification and analysis support • Analysis of hazard mitigation actions
Director of Operations, Kremmling Memorial Hospital District	<ul style="list-style-type: none"> • Review draft documents
Director, Kremmling Public Works	<ul style="list-style-type: none"> • Analysis of hazard mitigation actions • Review draft documents
Town of Hot Sulphur Springs	
Manager, Town of Hot Sulphur Springs	<ul style="list-style-type: none"> • Project planning and approval • Review draft documents
Fire Chief, Hot Sulphur Springs-Parshall Fire Protection District	<ul style="list-style-type: none"> • Provide hazard identification and analysis support • Analysis of hazard mitigation actions

Grand County and Participating Jurisdictions	
Project Participant	General Project Role
Grand County	
Director, Hot Sulphur Public Works	<ul style="list-style-type: none"> • Analysis of hazard mitigation actions • Review draft documents
Town of Granby	
Manager, Town of Granby	<ul style="list-style-type: none"> • Project planning and approval • Review draft documents
Chief, Granby Police Department	<ul style="list-style-type: none"> • Review draft documents
Fire Chief, Grand Fire Protection District	<ul style="list-style-type: none"> • Provide hazard identification and analysis support • Analysis of hazard mitigation actions
Director of Operations, Centura Granby Medical Center	<ul style="list-style-type: none"> • Review draft documents
Risk Management, Winter Park Ski Resort	<ul style="list-style-type: none"> • Provide hazard identification and analysis support • Analysis of hazard mitigation actions • Review draft documents
Director, Winter Park Ski Patrol	<ul style="list-style-type: none"> • Provide hazard identification and analysis support • Analysis of hazard mitigation actions • Review draft documents
Director, Granby Public Works	<ul style="list-style-type: none"> • Analysis of hazard mitigation actions • Review draft documents
Town of Grand Lake	
Manager, Town of Grand Lake	<ul style="list-style-type: none"> • Project planning and approval • Review draft documents
Fire Chief, Grand Lake Fire Protection District	<ul style="list-style-type: none"> • Provide hazard identification and analysis support • Analysis of hazard mitigation actions
Director, Grand Lake Public Works	<ul style="list-style-type: none"> • Analysis of hazard mitigation actions • Review draft documents
Town of Fraser	
Manager, Fraser	<ul style="list-style-type: none"> • Project planning and approval • Review draft documents
Chief, Fraser-Winter Park Police Department	<ul style="list-style-type: none"> • Review draft documents
Fire Chief, East Grand Fire Protection District	<ul style="list-style-type: none"> • Provide hazard identification and analysis support • Analysis of hazard mitigation actions
Director, Kremmling Public Works	<ul style="list-style-type: none"> • Analysis of hazard mitigation actions • Review draft documents
Town of Winter Park	
Manager, Town of Winter Park	<ul style="list-style-type: none"> • Project planning and approval • Review draft documents
Chief, Fraser-Winter Park Police Department	<ul style="list-style-type: none"> • Review draft documents
Fire Chief, East Grand Fire Protection District	<ul style="list-style-type: none"> • Provide hazard identification and analysis support • Analysis of hazard mitigation actions
Director of Operations, Centura 7-Mile Medical Clinic	<ul style="list-style-type: none"> • Review draft documents
Director, Winter Park Public Works	<ul style="list-style-type: none"> • Analysis of hazard mitigation actions • Review draft documents
Risk Management, Winter Park Ski Resort	<ul style="list-style-type: none"> • Provide hazard identification and analysis support • Analysis of hazard mitigation actions • Review draft documents
Director, Winter Park Ski Patrol	<ul style="list-style-type: none"> • Provide hazard identification and analysis support • Analysis of hazard mitigation actions • Review draft documents

Grand County Pre-Disaster Mitigation Plan

The Grand County Local Emergency Planning Committee contributed to the review, guidance, and approval of the Plan. This Local Emergency Planning Committee includes representatives from:

Grand County Local Emergency Planning Committee	
<ul style="list-style-type: none"> • Grand County Office of Emergency Management • Grand County Sheriff's Office • Grand County EMS • Grand County Board of County Commissioners • Grand County Search and Rescue Group • Mountain Parks Electric • East Grand School District • United States Forest Service • Colorado Forest Service • Town of Kremmling • Town of Grand Lake 	<ul style="list-style-type: none"> • Kremmling Police Department • Granby Police Department • Fraser-Winter Park Police Department • Kremmling Fire Protection District • Hot Sulphur Springs-Parshall Fire Protection District • Grand Fire Protection District • Grand Lake Fire Protection District • East Grand Fire Protection District • Kremmling Memorial Hospital District • Centura Granby Medical Center • Centura 7-Mile Medical Clinic • Colorado West Mental Health, Alpine Center • American Red Cross, Mile High Chapter

The State of Colorado Division of Emergency Management was consulted pursuant to the State's hazard mitigation planning efforts. Experts from government agencies and private organizations outside Grand County also contributed to the plan. In some instances these non-County expert resources contributed to this project as part of the Grand County Safety Council. The non-County experts listed in the following table, however, provided detailed input to the plan collected through a series of interviews, plan analysis activities, and plan reviews. These non-county experts are summarized in the following table.

Resources Not Employed by the County or Participating Jurisdictions Contributing to the PDMP Development	
Project Participant	General Project Role
Chairman, Emergency Management Committee	<ul style="list-style-type: none"> • Provide hazard identification and analysis support • Analysis of hazard mitigation actions • Review draft documents
Principal Engineer, Environment and Engineering Avalanche Consultant	<ul style="list-style-type: none"> • Hazard modeling and risk assessment consultant
President, Mountain Rescue, Grand County	<ul style="list-style-type: none"> • Provide hazard identification and analysis support • Analysis of hazard mitigation actions • Review draft documents
Director of Safety, Colorado Motor Carriers	<ul style="list-style-type: none"> • Provide hazard identification and analysis support • Analysis of hazard mitigation actions
Engineer, Colorado Geological Survey	<ul style="list-style-type: none"> • Provide hazard identification and analysis support • Analysis of hazard mitigation actions
Meteorologist, National Weather Service	<ul style="list-style-type: none"> • Provide hazard identification and analysis support • Analysis of hazard mitigation actions
District Forester	<ul style="list-style-type: none"> • Provide hazard identification and analysis support • Analysis of hazard mitigation actions
Captain, Colorado State Patrol	<ul style="list-style-type: none"> • Review draft documents • Provide traffic data
Regional Planner, Colorado Division of Emergency Management	<ul style="list-style-type: none"> • Analysis of hazard mitigation actions • Review draft documents

Resources Not Employed by the County or Participating Jurisdictions Contributing to the PDMP Development	
Project Participant	General Project Role
Director, American Red Cross	<ul style="list-style-type: none"> • Review draft documents
Senior Member, The Infrastructure Protection Group, LLC	<ul style="list-style-type: none"> • PDMP Consultant for project planning • Project kick-off facilitator • Draft Plan development • Hazard identification, risk Assessment and mitigation guidance
Vice President, Coalfire Systems, Inc.	<ul style="list-style-type: none"> • PDMP Consultant for project planning • Project kick-off facilitator • Draft Plan development • Hazard identification, risk Assessment and mitigation guidance

Community participation

Grand County recognizes that its community members provide valuable input and insight to the hazard mitigation planning process. The methodology used in developing this Plan maximized public involvement by utilizing a variety of informational resources and survey techniques. Public comment was collected through hardcopy and web-based surveys to expand the potential for broader public participation. As part of this survey process, the planning team also collected input from professionals in emergency management, fire services, medical and health services, law enforcement, planning, education, airport management, government administration, community development, transportation, utilities, and others in public and private sectors.

The community's opinions of the hazards most threatening to their environment were used to identify and prioritize hazards and direct mitigation efforts. Public involvement also helped determine critical infrastructures subject to hazard impact. Sample survey forms and tabulated survey results are attached to the Plan as Appendix B.

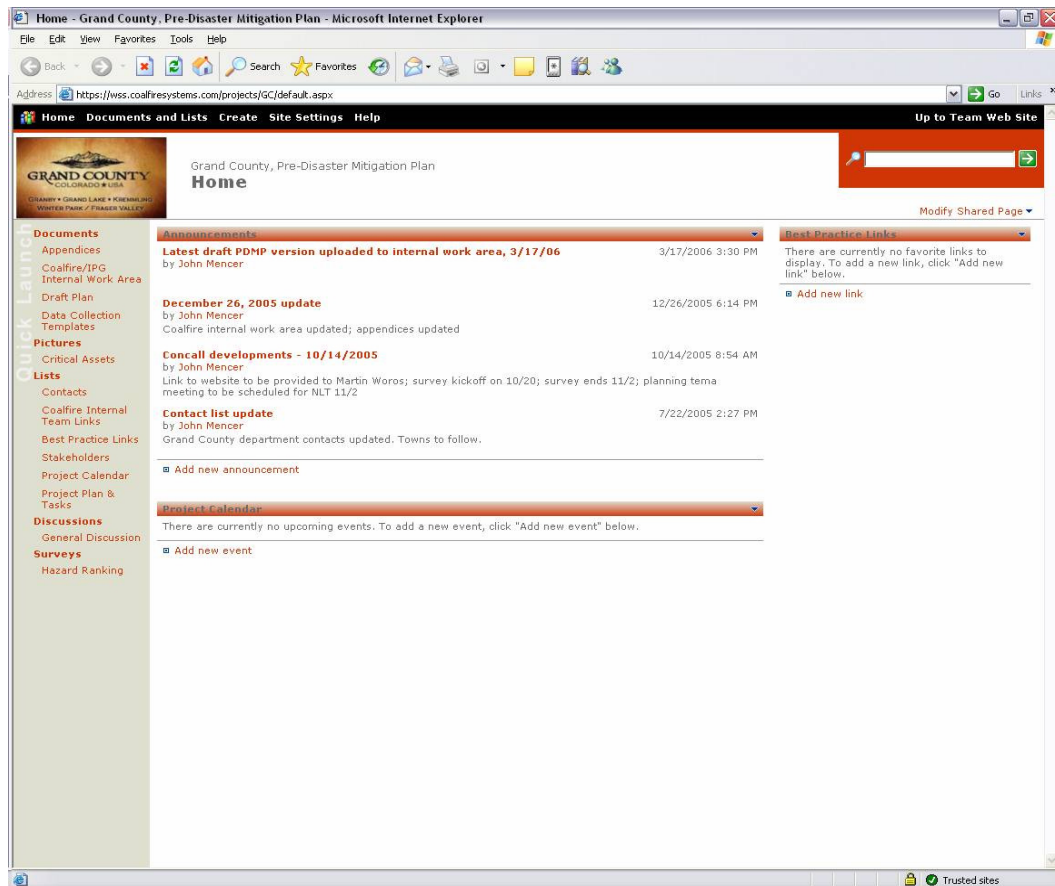
PROJECT INITIATION AND TEAM COORDINATION

Project planning was initiated through a project charter meeting conducted in Granby on September 29, 2005. The purpose of this meeting was to assemble primary project participants and confirm contact information as well as project activities, deliverables, schedules, roles, and responsibilities. This meeting resulted in a charter document created to guide Plan development.

As indicated previously, the plan is developed from input from a broad group of participants and stakeholders. To accommodate scheduling issues and provide a mechanism to most efficiently and securely collaborate on the planning activities, Grand County managed the Plan development with a secure project portal accessible from the Internet. This project portal supports planning activities and project communications, including document retention and destruction. Portal access rights are developed based on authority granted by each County project lead.

A representation of the project portal home page is shown in the following figure.

Grand County Pre-Disaster Mitigation Plan



HAZARD IDENTIFICATION

The United States is vulnerable to a wide variety of natural hazards that threaten life and property, including damage to critical facilities and disruption of vital services. Furthermore, continuing local and national events establish that risks exist from human-caused hazards ranging from accidents to domestic and international terrorism and, as Grand County itself experienced in June, 2004, bizarre random acts of extreme violence. The planning team considered a comprehensive list of hazards and used risk assessment activities to prioritize certain hazards for mitigation actions on a jurisdictional basis.

THE RISK ASSESSMENT

A risk assessment was conducted to analyze hazards, determine loss estimates, and establish a rational, supportable basis for selection of mitigation actions. The risk assessment encompassed these activities:

- Public input - Using community surveys discussed previously in this section, citizens provide input on hazards and hazard impact within the planning area.
- Risk assessment – Based on subject matter expertise provided by emergency services professionals within Grand County and experts in the private sector, hazards were ranked and impact estimated.
- Identification of critical infrastructure – Resources, facilities and services within the planning area were evaluated for hazard impact and loss expectancy.

The results of these activities allowed Grand County to identify and profile hazards affecting it and its incorporated towns. The planning team used this information to determine vulnerabilities and provide the factual basis for the mitigation actions selected.

REVIEW OF CURRENT PLANS, STUDIES AND REPORTS

To validate potential mitigation options and to coordinate outcome from the Plan with existing mitigation strategies and plans, the planning team reviewed hazard studies, emergency planning reports, and other documents currently covering prioritized hazards within Grand County. These existing plans and documents reviewed are summarized in the Hazard Mitigation section of this document.

MITIGATION PLANNING

The risk assessment process identified hazards considered a priority within Grand County, and the planning team developed and documented goals and objectives to guide mitigation planning efforts. The team also developed and evaluated strategies for implementing justified and prioritized mitigation actions.

The Grand County PDMP team conducted research, reviewed county plans, and interviewed experts to collect potential mitigation actions for these prioritized hazards. Potential mitigation actions and strategies then were evaluated using the FEMA-recommended STAPLEE methodology, which seeks to identify options acceptable and appropriate for the community. STAPLEE evaluates mitigation options by comparing them to these criteria: **S**ocial acceptance, **T**echnical merit, **A**ddministrative support, **P**olitical support, **L**egal support, **E**conomic viability and the **E**nvironment. Mitigation alternatives were also evaluated for cost-benefit and compared to current mitigation projects underway. The results of this process defined the mitigation actions included with the plan submitted for adoption by Grand County and their participating jurisdictions.

Implementation strategies for prioritized mitigation actions were developed at a strategic level to guide follow-on planning efforts. All targeted mitigation strategies were assigned points of contact within Grand County.

PLAN MAINTENANCE AND ADOPTION

Grand County will periodically review the plan and determine whether any significant changes have occurred requiring modifications to proposed mitigation actions and the Plan document. As discussed in the Plan Maintenance section of this document, the planning team has selected specific timeframes and criteria and assigned roles for Plan review and update. It is anticipated that a subcommittee of the Grand County Local Emergency Planning Committee will be responsible for the review and update of the Plan. Public input is important to the development and maintenance of the plan, and Grand County will continue to seek input from a variety of sources, including residents. Significant modifications to the Plan also necessitate adoption by the appropriate governing bodies within the County.

Community Profile - Grand County, CO

GEOGRAPHY

Grand County is located in the north central region of Colorado and is home to some of the loveliest and most rugged mountain ranges in the state. According to the U.S. Census Bureau, the county has a total area of 1,870 square miles. Of that total, 1,847 miles are land and 23 miles are water. The total area of the county is 1.23% water. The county seat is Hot Sulphur Springs. Grand County's other towns are Fraser, Granby, Grand Lake, Kremmling, Parshall, Tabernash, and Winter Park.

DEMOGRAPHICS

As of the census of 2000, there were 12,442 people, 5,075 households, and 3,217 families residing in the county. The estimated population in 2004 was 13,253. This was an increase of 6.52% from the 2000 census. In 2000 the population density was 7 per mile. There are 10,894 housing units at an average density of 6 per mile. The racial makeup of the county is 95.15% White, 0.48% Black or African American, 0.43% Native American, 0.68% Asian, 0.10% Pacific Islander, 2.00% from other races, and 1.15% from two or more races. 4.36% of the population is Hispanic or Latino of any race.

There are 5,075 households out of which 28.10% have children under the age of 18 living with them, 54.70% are married couples living together, 5.20% have a female householder with no husband present, and 36.60% are non-families. 24.80% of all households are made up of individuals and 4.80% have someone living alone who is 65 years of age or older. The average household size is 2.37 and the average family size is 2.85.

In the county, the population is spread out with 21.80% under the age of 18, 9.00% from 18 to 24, 34.70% from 25 to 44, 26.80% from 45 to 64, and 7.80% who are 65 years of age or older. The median age is 37 years. For every 100 females there are 112.70 males. For every 100 females age 18 and over, there are 115.70 males.

The median income for a household in the county is \$47,759, and the median income for a family is \$55,217. Within the county's total population, 7.90% of those under the age of 18 and 6.10% of those 65 and older are living below the poverty line. In 2002, the per capita personal income in Grand County was \$29,560. This was an increase of 27.9% from 1997. The 2002 figure was 96% of the national per capita income, which was \$30,906.

HISTORY

Grand County was created on February 2, 1874 from a portion of Summit County, and it contained land to the western and northern borders of the state, which is now in present day Moffat County and Routt County. On January 29, 1877, Routt County was created and Grand County was reduced to its current western boundary. When valuable minerals were found in North Park, Grand County claimed the area as part of its county, a claim Larimer County also held. It took a decision by the Colorado Supreme Court in 1886 to declare North Park part of Larimer County, and thus the county's northern boundary was set.

Grand County is located about 67 miles from Denver and is a highly popular winter and summer recreation destination. It features limitless trails, vast meadows, soaring peaks, and numerous recreational opportunities including all snow sports, mountain climbing, skating, ice fishing, hunting and, in the summer, golf, hot air balloon rides boating, camping and more. Grand County is home to the spectacular beauty of the Rocky Mountain National Park and the Arapaho National Forest. Elk, moose, deer, and bighorn sheep are frequent autumn visitors along Rocky Mountain National Park trails. The Windy Gap Reservoir, just west of Granby on U.S. Highway 40, serves as a sanctuary for dozens of species of

migrating birds, and bald eagle sightings are becoming increasingly common in the area. It's not uncommon either to spot a moose meandering through the town of Grand Lake. In fact, recent encounters between moose and man took on a very serious note when one elderly resident was seriously injured and another escaped harm in separate incidents.

Land use projections and high property values in both Grand County indicate that residential and commercial property trends will continue to include development in the urban – wildland interface. This eventuality increases risk from hazards such as wildfire, avalanche, and rock slides, and places significant demands on emergency planning and response resources.

The following is a description of the towns in Grand County, Colorado:

As of 2000, the town of Fraser had a total population of 910. The town is located in Middle Park in the valley of the Fraser River along U.S. Highway 40. Its location northwest of Winter Park, the location of several popular ski resorts, has provided growth in recent years with new condominium and other real estate developments.

This town is at an elevation of 8,574 feet and was established in 1871. It was laid out along the Fraser River by George Easton and originally named for him. Rueben Frazier, an early settler in the area, was well known by most of the locals and it wasn't long before people started calling the town Frazier. When the US Postal Authority granted a post office, they decided on an easier spelling, and thus took the name of the nearby Fraser River. Fraser was the center of the timber industry until the Forest Service headquarters was moved to Hot Sulphur Springs in 1915, and the Ranger Station to Idlewild. The town was incorporated in 1953.



In 2000, there were 910 people, 410 households, and 191 families residing in the town. The population density is 491.1 per mile. There are 622 housing units at an average density of 335.7 per mile. The racial makeup of the town is 94.51% White, 0.88% African American, 0.88% Native American, 0.88% Asian, 0.22% Pacific Islander, 1.10% from other races, and 1.54% from two or more races. 3.30% of the population is Hispanic or Latino of any race.

Within the 410 households, 25.1% have children under the age of 18 living in them, 33.2% are married couples living together, 9.0% have a female householder with no husband present, and 53.2% are non-families. 27.6% of all households are made up of individuals and 3.2% have someone living alone who is 65 years of age or older. The average household size is 2.21 and the average family size is 2.71. In the town, the population is spread out with 17.9% under the age of 18, 14.2% from 18 to 24, 46.2% from 25 to 44, 18.0% from 45 to 64, and 3.7% who are 65 years of age or older. The median age is 31 years. For every 100 females there are 129.8 males. For every 100 females age 18 and over, there are 130.6 males.

The median income for a household in the town is \$38,173, and the median income for a family is \$39,643. Males have a median income of \$29,583 versus \$26,346 for females. The per capita income for the town is \$20,628. 8.8% of the population and 11.1% of families are below the poverty line. Out of the total population, 9.8% of those under the age of 18 and 0.0% of those 65 and older are living below the poverty line.

Granby lies along U.S. Highway 40 about 85 miles west of Denver, Colorado, southwest of Rocky Mountain National Park. As of the 2000 census, the town had a total population of 1,525.



The town was founded in 1904 along the route of the Denver, Northwestern & Pacific Railway, and incorporated one year later. It was named after Granby Hillyer, a Denver lawyer who later was a United States Attorney.

Granby is 7,935 feet above sea level, and is subject to average annual rainfall of 12¼ inches and annual snowfall of over 128 inches. According to the United States Census Bureau, the town has a total area of 1.8 square miles, none of which is covered by water.

As of the census of 2000, there were 1,525 people in the town, organized into 579 households and 390 families. The population density is 856.2 per square mile. There are 628 housing units at an average density of 352.6 per square mile. The racial makeup of the town is 96.26% White, 0.46% African American, 0.26% Native American, 0.98% Asian, 0.07% Pacific Islander, 1.44% from other races, and 0.52% from two or more races. 3.61% of the population is Hispanic or Latino of any race.

Within the 579 Granby households, 37.3% have children under the age of 18 living with them, 55.3% are married couples living together, 7.6% have a female householder with no husband present, and 32.5% are non-families. 21.9% of all households are made up of individuals and 6.4% have someone living alone who is 65 years of age or older. The average household size is 2.59 and the average family size is 3.05.

In the town, the population is spread out with 28.1% under the age of 18, 9.1% from 18 to 24, 33.5% from 25 to 44, 22.7% from 45 to 64, and 6.6% who are 65 years of age or older. The median age is 34 years. For every 100 females there are 98.6 males. For every 100 females age 18 and over, there are 104.3 males.

The median income for a household in the town is \$46,667, and the median income for a family is \$55,250. Males have a median income of \$35,455 versus \$24,417 for females. The per-capita income for the town is \$21,224. 5.8% of the population and 4.0% of families are below the poverty line. Out of the total population, 3.9% of those under the age of 18 and 9.0% of those 65 and older are living below the poverty line.

Grand Lake had a total population of 447 in 2000. This town is at an elevation of 8,437 feet and was established in 1879. It derives its name from the nearby lake, the largest natural body of water in the state. The town was originally an outfitting and supply point for the mining settlements of Lulu City, Teller City, and Gaskill, but today is more of a tourist town. It was incorporated June 23, 1944 and briefly held the county seat from 1882 to 1888.

According to the United States Census Bureau, the town has a total area of 0.9 square miles, and none of it is covered by water (the town does not encircle the lake).

Grand Lake itself is a natural lake and one of the headwaters of the Colorado River in Grand County. The elevation of the lake surface is 2,550 meters. It is the largest natural lake in the state of Colorado, formed by the damming of several streams by a glacial moraine. It lies adjacent to Rocky Mountain National Park. Grand Lake itself was named "Spirit Lake" by

the Ute Indians. They believed the lake's cold waters to be the dwelling place of departed souls and would avoid it. The lake is part of the Colorado-Big Thompson Project which diverts water east under the Continental Divide through a tunnel. The western end is near the center of the far shore in the photo above. As part of the project, water is pumped into Grand Lake from nearby manmade reservoirs Lake Granby and Shadow Mountain Lake.

In addition to its population of 447 people, 219 households and 121 families resided in



Grand Lake in 2000. The population density is 472.5 per square mile. There are 748 housing units at an average density of 790.7 per square mile. The racial makeup of the town is 96.20% White, 0.67% African American, 0.89% Native American, 0.67% Asian, 0.00% Pacific Islander, 0.22% from other races, and 1.34% from two or more races. 2.68% of the population is Hispanic or Latino of any race.

Within the town's 219 households, 21.0% have children under the age of 18 living with them, 46.6% are married couples living together, 3.2% have a female householder with no husband present, and 44.7% are non-families. 35.2% of all households are made up of individuals and 5.5% have someone living alone who is 65 years of age or older. The

average household size is 2.02 and the average family size is 2.60.

In the town, the population is spread out with 16.8% under the age of 18, 6.3% from 18 to 24, 29.3% from 25 to 44, 35.6% from 45 to 64, and 12.1% who are 65 years of age or older. The median age is 44 years. For every 100 females there are 124.6 males. For every 100 females age 18 and over, there are 122.8 males.

The median income for a household in the town is \$45,096, and the median income for a family is \$55,750. Males have a median income of \$30,833 versus \$26,250 for females. The per capita income for the town is \$34,676. 7.0% of the population and 3.0% of families are below the poverty line. Out of the total population, 7.4% of those under the age of 18 and 0.0% of those 65 and older are living below the poverty line.

Hot Sulphur Springs had a total population of 521 in the census of 2000. It is the county seat of Grand County. This town is at an elevation of 7,680 feet. It was originally a summer



campground for Indians who came for the hot springs. When Grand County was formed, it was the first county seat from 1874 to 1882, after which it moved to Grand Lake. The county seat returned in 1888 and has been here ever since. This town was established in 1860 making it the oldest town in the county and originally named Saratoga West and sometimes called Warm Springs. In 1863, the name was changed to reflect the hot springs in the areas that were used for medicinal purposes. The town site was bought by William Newton Byers, founder of the Rocky Mountain News, in 1864. He wished to make it a spa and resort. So he surveyed, platted,

and named the streets to the city. It was incorporated April 1, 1903.

According to the US Census Bureau, the town has a total area of 0.8 square miles, none of which is covered by water. As of the 2000 census, there were 521 people, 196 households, and 131 families residing in the town. The population density is 674.5 square miles. There are 227 housing units at an average density of 293.9 square miles. The racial makeup of the town is 94.82% White, 0.38% African American, 1.92% Native American, 0.00% Asian, 0.00% Pacific Islander, 2.11% from other races, and 0.77% from two or more races. 7.10% of the population is Hispanic or Latino of any race.

Within the 196 households, 32.1% have children under the age of 18 living with them, 57.7% are married couples living together, 5.1% have a female householder with no husband present, and 32.7% are non-families. 25.5% of all households are made up of individuals and 7.1% have someone living alone who is 65 years of age or older. The average household size is 2.45 and the average family size is 2.98.

The population of Hot Sulphur Springs is spread out with 24.4% under the age of 18, 9.0% from 18 to 24, 34.7% from 25 to 44, 25.7% from 45 to 64, and 6.1% who are 65 years of age or older. The median age is 36 years. For every 100 females there are 122.6 males. For every 100 females age 18 and over, there are 134.5 males.

The median income for a household in the town is \$39,306, and the median income for a family is \$46,000. Males have a median income of \$42,431 versus \$20,208 for females. The per capita income for the town is \$24,012. 5.7% of the population and 2.3% of families are below the poverty line. Out of the total population, 4.0% of those under the age of 18 and 9.1% of those 65 and older are living below the poverty line.

Kremmling had a total population of 1,578 in 2000. The town sits along the upper Colorado River in the lower arid section of Middle Park between Byers Canyon and Gore Canyon. The town is located approximately at the mouth of both the Blue River and Muddy Creek, which descend respectively from the south and north, providing valley access to Dillon and Steamboat Springs. The town was founded in 1881 during the Colorado Silver Boom days, but the lack of mineral resources in the nearby mountains made the town grow very slowly in the early days.

The area started as a general store run by Rudolph "Kare" Kremmling. He had his store on the north side of Muddy Creek, but in 1881 two brothers, Aaron and John Kinsey, made part of their ranch into a town and called it Kinsey City. Kare Kremmling moved his store across the river to the new site and soon people were calling the place "Kremmling". The original post office was called Kinsey City and ran from 1881 to 1885 with Kare Kremmling acting as the first Post Master. The name Kremmling was not officially recognized until 1895. After the Moffat railroad, Northwestern & Pacific arrived in 1906; Kremmling became the county's central shipping point. It was incorporated



May 14, 1904 and as the 20th century progressed, ranching became the main industry in the valley in the vicinity of the town.

According to the US Census Bureau, the town has a total area of 1.3 square miles, none of which is covered by water. As of 2000, there are 1,578 people, 595 households, and 423 families residing in the town. The population density is 1,185.9 per square mile. There are 646 housing units at an average density of 485.5 per square mile. The racial makeup of the town is 92.90% White, 0.06% African American, 0.25% Native American, 0.25% Asian, 0.13% Pacific Islander, 4.12% from other races, and 2.28% from two or more races. 8.56% of the population is Hispanic or Latino of any race.

Within the 595 households, 38.8% are with children under the age of 18, 56.3% are married couples living together, 8.4% have a female householder with no husband present, and 28.9% are non-families. 24.4% of all households are made up of individuals and 6.7% have someone living alone who is 65 years of age or older. The average household size is 2.58 and the average family size is 3.07.

The population of Kremmling is spread out with 29.0% under the age of 18, 8.4% from 18 to 24, 33.6% from 25 to 44, 20.8% from 45 to 64, and 8.1% who are 65 years of age or older. The median age is 34 years. For every 100 females there are 101.8 males. For every 100 females age 18 and over, there are 109.0 males.

The median income for a household in the town is \$45,605, and the median income for a family is \$51,023. Males have a median income of \$38,333 versus \$25,385 for females. The per capita income for the town is \$19,687. 8.1% of the population and 8.2% of families are below the poverty line. Out of the total population, 13.6% of those under the age of 18 and 1.6% of those 65 and older are living below the poverty line.

Parshall is a small unincorporated community in Grand County. It is located along the south side of U.S. Highway 40 between Hot Sulphur Springs and Kremmling, on the north bank of the Colorado River downstream from Byers Canyon. The community consists of a cluster of houses and trailers, as well as a post office and general store.



Tabernash is a "census-designated place" located in Grand County. (CDPs are communities that lack separate municipal government, but which otherwise resemble incorporated places, such as cities or villages. CDPs are delineated to provide data for settled concentrations of population that are identifiable by name but are not legally incorporated under the laws of the state in which they are located. They are often informally called "unincorporated towns.")

According to the United States Census Bureau, Tabernash has a total area of 4.1 square miles, none of which is covered by water. As of the census of 2000, there are 165 people, 72 households, and 38 families residing in Tabernash. The population density is 40.8 per square mile. There are 103 housing units at an average density of 25.5 per square mile. The racial makeup of Tabernash is 96.36% White, 1.21% African American, 0.61% Native American, 0.61% Asian, 0.00% Pacific Islander, 0.61% from other races, and 0.61% from two or more races. 1.82% of the population is Hispanic or Latino of any race.

Within Tabernash's 72 households, 25.0% have children under the age of 18 living in them, 47.2% are married couples living together, 4.2% have a female householder with no

husband present, and 47.2% are non-families. 26.4% of all households are made up of individuals and 2.8% have someone living alone who is 65 years of age or older. The average household size is 2.29 and the average family size is 3.03.

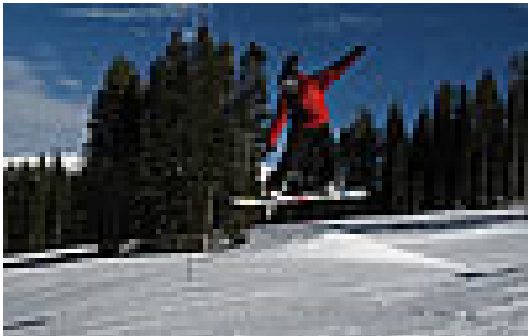
In Tabernash, the population is spread out with 24.2% under the age of 18, 4.2% from 18 to 24, 47.3% from 25 to 44, 18.2% from 45 to 64, and 6.1% who are 65 years of age or older. The median age is 34 years. For every 100 females there are 123.0 males. For every 100 females age 18 and over, there are 140.4 males.



The median income for a household is \$40,179, and the median income for a family is \$12,411. Males have a median income of \$36,250 versus \$24,750 for females. The per capita income for Tabernash is \$20,485. 27.4% of the population and 51.1% of families are below the poverty line. Out of the total population, 27.6% of those under the age of 18 and 100.0% of those 65 and older are living below the poverty line.

Winter Park had a total population of 662 during the 2000 census, although tourists and seasonal workers significantly increase the population. It is home to the Winter Park Resort, a well-known ski resort. The town and resort are served by the Ski Train of the Denver & Rio Grande Western Railroad. The area also has ample cross-country skiing opportunities, including Devil's Thumb Ranch. Recreational activities continue unabated in the spring and summer, and during those seasons Winter Park is known for mountain biking, concerts, hiking, golf, and fishing.

According to the US Census Bureau, the town has a total area of 8.1 square miles and none of it is covered by water. It is approximately 9100 feet above sea level, and is considered alpine country. It is completely snow covered several months out of the year.



As of 2000, there were 662 people, 318 households, and 129 families residing in the town. The population density is 82.1 per square mile. There are 1,231 housing units at an average density of 152.7 per square mile. The racial makeup of the town is 96.53% White, 0.15% African American, 0.60% Native American, 0.91% Asian, 0.00% Pacific Islander, 0.45% from other

races, and 1.36% from two or more races. 1.36% of the population is Hispanic or Latino of any race. There are 318 households out of which 14.8% have children under the age of 18 living with them, 33.3% are married couples living together, 5.0% have a female householder with no husband present, and 59.4% are non-families. 38.4% of all households are made up of individuals and 4.4% have someone living alone who is 65 years of age or older. The average household size is 2.04 and the average family size is 2.67. In the town, the population is spread out with 12.5% under the age of 18, 11.5% from 18 to 24, 44.0% from 25 to 44, 27.0% from 45 to 64, and 5.0% who are 65 years of age or older. The median age is 36 years. For every 100 females there are 143.4 males. For every 100 females age 18 and over, there are 143.3 males.

The median income for a household in the town is \$44,000, and the median income for a family is \$80,660. Males have a median income of \$35,221 versus \$27,500 for females. The

per capita income for the town is \$36,699. 9.2% of the population and 3.3% of families are below the poverty line. Out of the total population, 6.8% of those under the age of 18 and 0.0% of those 65 and older are living below the poverty line.

AIRPORTS

Located in open terrain atop the Granby Mesa, the Grand County/Granby airport provides a readily accessible mountain airfield into Colorado's Great Lakes Region, which includes Lake Granby, Shadow Mountain Lake, Grand Lake, the Rocky Mountain National Park, and the ski resorts of Winter Park/Mary Jane and Sol Vista Ski Basin. The county plows the runway in winter and there are no fees. Due to rising terrain to the east and the highly noise-sensitive area nearby, good mountain pilots rarely, if ever, take off in that direction.

Mc Elroy Airfield is another Grand County public airport located in Kremmling at an altitude of 7,411 feet. The airport is located in a fairly wide portion of the Colorado River Valley surrounded by mountainous terrain. An 8,764-foot mountain lies approximately 2 miles to the southeast of Runway 27. Grand Lake is 41 miles to the northeast and the Winter Park ski area is 48 miles to the southeast. Dillon, the gateway to Keystone, Arapahoe Basin, Breckenridge, and Copper Mountain ski areas, lies 38 miles to the south.

DAMS

The county has nine Class I and nine Class II dams located throughout its boundaries. According to the state's Division of Emergency Management, all the Class I dams have emergency preparedness plans in place.

PRESIDENTIAL AND U.S.D.A - DECLARED DISASTERS

The tables below describe disasters declared previously by presidential order in the planning area.

Grand County		
Hazard Type	Location	Disaster Characterization
Drought	Grand County	USDA Disaster, 2000
Drought	Grand County	USDA Disaster, 2002
Wildfires	Grand County	Presidential Disaster, 2002
Winter Storm	Grand County	Presidential Emergency, 2003

Hazards in Grand County

The State of Colorado is vulnerable to a wide variety of natural hazards that can threaten life and property. Damage to critical facilities and disruption of vital services caused by natural hazards has a significant impact on its communities. Additionally, recent local and national events establish that risks exist from human-caused hazards ranging from accidents to domestic and international terrorism. In an example that hit all too close to home, a serious incident in the town of Granby in June, 2004 made national headlines and resulted both in loss of life and very significant property damage. The section below discusses that incident and all other hazards deemed to have a potential impact on Grand County, and it further delineates those “priority” hazards facing the county as selected by a consensus of citizens and experts.

Hazards having significant loss potential for Grand County are identified as Priority Hazards. Other hazards with less potential impact or with less effective mitigation action possibilities are discussed later in this section and are referred to as ‘Other Hazards’.

In this plan, the determination of the Priority Hazards was made through a multi-step risk assessment process combining statistical modeling with more qualitative assessment activities. These qualitative risk tasks consisted of numerous interviews and surveys of emergency response and planning professionals, online and written surveys of County residents and independent Historical research, which drew information from many sources. Through this process, certain hazards were determined to pose the greatest threats to the planning area and were prioritized as discussed in the following section.

PRIORITIZED HAZARDS

Based on the risk assessment discussed elsewhere in this Plan, the planning team prioritized these hazards for further analysis and mitigation planning:

- Wildfires
- Winter Storms
- HAZMAT – transported
- Landslides/Rockslides
- Disease Outbreak

Of secondary concern to the planning team were the hazards of Lightning/ Thunderstorms and Drought. The team determined however that the five top prioritized hazards posed a greater overall risk to life, safety, critical infrastructure, and vital services. Future iterations of the PDMP will possibly include mitigation actions for hazards other than those prioritized by this Plan.

Grand County experienced a number of Disaster Declarations in the past 20 years, including United States Department of Agriculture Disaster Declarations in 2000 and 2002 for drought; and a Presidential Disaster Declaration in 2002 for wildfires and a Presidential Emergency declaration in 2003 for a massive winter storm.

WILDFIRE

Grand County is not unique in the State of Colorado for its recent and difficult experiences with wildfire. In fact, the entire Rocky Mountain region has been plagued with wildfires in

the past several years. The situation has been fueled by severe drought conditions throughout the western U.S. in the recent past, and it is no surprise that the PDMP risk assessment determined that wildfires pose the most significant threat to the planning area. The wildfire threat is characterized by three classes of fire:

- Surface fire: the most common of these three categories, the surface fire burns along the floor of a forest, moving slowly and killing or damaging trees.
- Ground fire: this fire is usually started by lightning or human carelessness and burns on or below the forest floor.
- Crown fire: these spread rapidly by wind and move quickly by jumping along the tops of trees.

Crown fires generally pose the largest immediate and long-term ecological effect and the greatest threat to human settlements near wildland areas. Surface fires play an important role of reducing low vegetation and woody, moss, lichens, and litter strata, which helps to temporarily reduce the chance of such fuels leading to severe crown fires. Ground fires reduce the accumulation of organic matter and carbon storage, and contribute to smoke production during active fires and long after the flames have ended. These fires can also damage and kill large trees by killing their roots and the lower stems.

Wildfire in Colorado is topographically separated into three fire demand zones. The Alpine zone is characterized by high altitude and primarily populated with spruce and fir. The Montane zone is next, and is populated by ponderosa pine and aspen woodlands. At the lowest but most densely populated elevations, the Pinon / Juniper zone is semi-arid and includes scrub oak woodlands.

Homes and cabins, subdivisions, resorts, recreational areas, organizational camps, businesses, and industries are all located within high fire hazard areas. Increasing recreational demands in popular mountain areas such as Grand County place more people in wild lands during holidays, weekends, and vacation periods. Compounding the fire hazard, residents and visitors to these areas are often inadequately educated or prepared for an inferno that sweeps through the brush and timber, impacting safety and destroying property in minutes.

The 2002 wildfire season was particularly memorable because it was the worst in United States history, with some 2.3 million acres burned, 2.1 million more than in 2000. In Colorado, 4,612 wildfires burned over 619,000 acres that year and cost approximately \$152 million in suppression costs. Approximately 81,400 people were evacuated and about 1,000 structures burned. In addition, nine lives were lost. Based on a ten-year average, Colorado typically experiences 3,119 wildfires with a loss of 70,000 acres per year.

History shows that most of Colorado's wildfires are frequently caused by lightning strikes from thunderstorms that regularly pass through the state during the summer months. Grand County experiences its share of these weather conditions and, in fact, lightning strikes were ranked as one of the more severe natural hazards in the county survey taken pursuant to this plan. Many of the subsequent storms fail to produce rain, and the lightning strikes sometimes create small hotspots of fire that have the potential to grow into larger full-fledged fires. The hotspots can spread over a large area and are very challenging for fire crews to locate and control. They also place a strain on fire suppression equipment and supplies, and many times the hotspots occur deep within the forest and go unnoticed until a larger fire erupts.

Wildfires - County Profile

The Colorado State Hazard Mitigation Plan identifies 21%, or 130,464 acres, as being within the moderate to high risk range. Much of this acreage is currently threatened by the ravages of the Mountain Pine Beetle as described in greater detail below:

Mountain Pine Beetle (*Dendroctonus ponderosae*)

The mountain pine beetle (MPB) is historically the primary cause of mortality in the old, slow-growing ponderosa, lodgepole, and limber pines in Colorado. According to experts, it is the insect that causes the most significant damage to the state's low and mid-elevation pine forests, and it has become the insect whose damage attracts the greatest public interest.

The mountain pine beetle attacks and kills trees in a manner similar to a pest known as the *ips* beetle. However, the MPB only produces one generation per year. It generally attacks trees that lack vigor due to old age and crowding, drought, fire, mechanical damage, or root disease. During the early stages of an outbreak, attacks are largely limited to trees under stress. As the beetle population increases, attacks often spread to healthy trees in the afflicted area. The density and similar ages of many of Colorado's ponderosa pine and mixed conifer forests is a significant influence in the size and rate of spread of the current outbreak. Scientists estimate that many stands are at least twice as dense as is desirable for natural resistance to bark beetles. MPB populations have nearly doubled each year since the mid 1990s, and aerial surveys indicated approximately 450,000 trees were infested over 150,000 acres in 2001 and an additional 600,000 trees had been impacted in 2002. More recent Aerial surveys recorded 1,256,320 trees killed by beetle activity in 2004, compared to 696,400 reported killed in 2003, 275,000 in 2000 and 13,000 in 1996. The situation, in short, appears to be worsening.

Lodgepole pine forests in Grand County continue to see the heaviest MPB mortality with concentrations around Lake Granby, along the William's Fork River near the Henderson Mine, and throughout the Troublesome Creek Watershed. The Climax Metals Corporation is actively salvaging infested timber on their 10,000 acre Henderson Mill property near Winter Park. The areas around Lake Granby continue to have increased tree mortality also.



The Vail and Grand River Valleys in Grand County continue to experience heavy mortality in lodgepole forests of similar age, where little diversity makes stands more susceptible to attack. The outbreak in this area prompted the U.S. Forest Service to initiate Forest Health Environmental Impact Statements (EIS) for the Vail Valley and the Arapaho National Recreation Area.

Once MPB successfully infests a tree, it is doomed. Preventive spraying before attack may protect individual high-value trees if done prior to the beetles' normal flight time in mid-July through September. More than 120,000 high-value trees near homes or in recreation areas are currently being treated by this method with assistance from the Colorado State Forest Service (CSFS). At the landscape scale, thinning that reduces competition, improves tree vigor, and lessens fire hazard is an excellent option for mitigation and can be followed by the reintroduction of fire where appropriate.



2002 mountain pine beetle damage along the Mountain pine beetle damage Front Range

During 2001 and 2002, the Colorado State Forest Service compiled a Wildland Urban Interface (WUI) Hazard Assessment for the purpose of mapping the residential areas throughout the State that lie in Wildland Fire Hazard Areas. WUIs are defined as the line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels. Various data sources including housing density, fuel load, and proximity to government lands were analyzed in a GIS model to identify the residential areas at risk. The WUI Hazard Assessment is intended to be used as a tool to compare fire hazard in various areas in Colorado and within Grand County itself. The Wildland Fire map at Appendix F illustrates clearly where the WUI communities within Grand County area converge with areas showing a high potential for Wildfire.



Grand County is a member of the Front Range Fuels Treatment Partnership, which is a coalition of federal, state, and local governments, land-management agencies, private landowners, conservation organizations, and other stakeholders. This partnership was

created to reduce wildland fire risks through sustained fuels treatment along Colorado's Front Range. The primary goal of the partnership is to enhance community sustainability and restore fire-adapted ecosystems over a 10-year period. Extensive participation from local governments, public involvement, and collaboration in identifying and supporting specific project areas and types of treatment are considered keys to future successes. Projects which have been successfully undertaken by the group thus far include the Upper South Platte Watershed Restoration Project, the Winiger Ridge Project, research at Cheesman Reservoir, and the Polhemus prescribed burn.

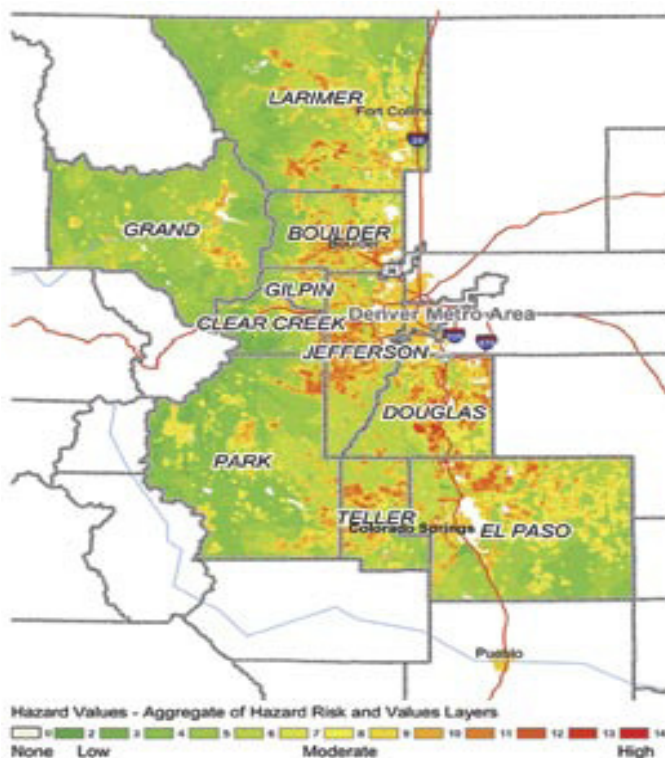
Some other grand projects are briefly described as follows:

The Arapaho National Recreation Area Forest Health Project will treat an area 2,515 acres in size in order to reduce hazardous fuels and the threat of the continuing mountain pine beetle epidemic.

The Upper Fraser Valley Forest Health Project area is located west of the Winter Park Ski area and includes portions of the Fraser Experimental Forest. Initial project design has begun and treatments to reduce hazardous fuels and reduce risk from mountain pine beetles have been proposed on about 5,000 acres.

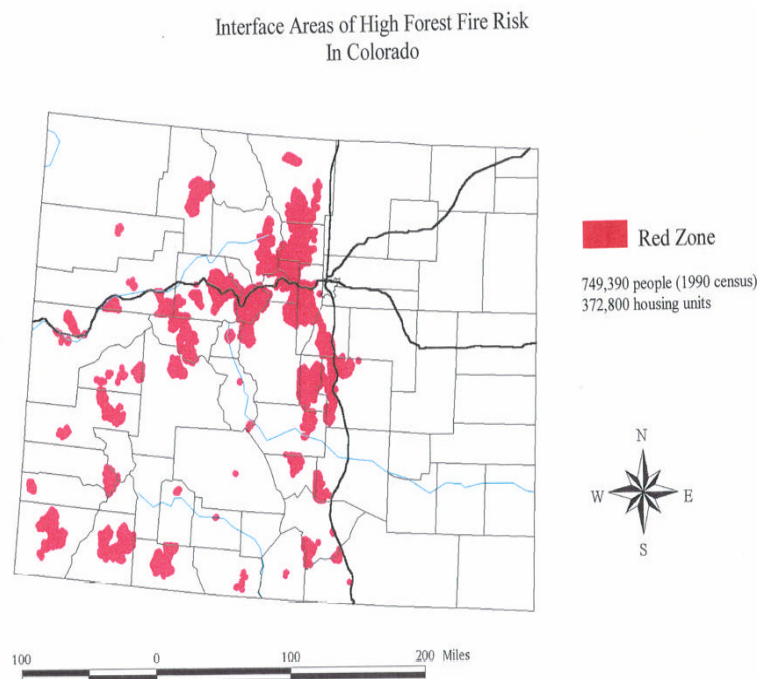
The Granby District completed management plans on 2,231 acres, treated 708 acres (including prescribed burning on 8 acres), and received Partnership funding for two projects.

An Environmental Assessment for wildland-urban interface fuels management, covering 3,670 acres, was finalized in 2002. During 2004, the fire and fuels management crew accomplished several fuels reduction projects in the wildland-urban interface along the park boundary, including 489 acres on the projects described below. Crews were to complete an additional 554 acres of fuels reduction treatments during 2005. Projects will continue on Deer Mountain, Emerald Mountain/Glacier Basin, Grand Lake, and Grand Cliff. In addition, a 37-acre prescribed fire is planned for Moraine Park.



In Grand Lake, trees were cut and thinned on 90 acres of park lands near the community of Grand Lake. The park fire crew also burned slash piles from a 22-acre thinning project completed the previous year.

Wildfire hazard risk within the Front Range Fuels Treatment Partnership area (2004).



WINTER STORMS

To the surprise of no one, winter storms can and do occur frequently within Colorado's high mountain country, and they vary significantly in size, strength, intensity, duration, and impact in Grand County. Strong winds create snowdrifts that block roads, create dangerous wind chill factors, and sometimes lead to life-threatening power outages. The National Weather Service issues a wind chill advisory when wind and temperature combine to produce wind chill values of 20 to 35 degrees below zero, significantly raising the potential for hypothermia and frostbite affecting health and safety. Hypothermia is the most common winter weather killer in Colorado. Ice accumulation becomes a hazard by creating dangerous travel conditions, and impacts safety for vulnerable elements of the population such as the elderly and physically impaired.

Winter Storms - County Profile

Winter weather storm systems from the northwest start in early November in Grand County and deposit large amounts of snow on leeward sides of mountain ridges. Winter weather can continue in the highest elevations until early June. Low temperatures are often below zero, and snowfall averages well over 100 inches in the higher elevations.

High winds and ice accumulation often accompany the area's winter storms. These winds can produce sizable snowdrifts that can cause residents and travelers to be stranded for hours in potentially life-threatening conditions. Communications problems are exacerbated by cell phone coverage that can be limited in some of the mountainous areas of Grand County. Hypothermia and carbon monoxide poisoning are also clear threats to many, especially those stranded travelers unfamiliar with the area and unprepared for the conditions. Besides impacting transportation, winter storms often batter and destroy utility lines and cause structural collapse. Sometimes the repair and removal costs of storm damage are very significant.

Ice accumulation poses a hazard in Grand County during many winter storms, particularly when it impacts Highways 40, 34, 9, and 125, the most important corridors for the

transport of people and the provisions needed for the continuity of normal life. A disruption or blockage due to vehicle crashes on these roads can cause major disruptions to Grand County and beyond. The Thanksgiving Day 2004 rockslide that damaged and closed I-70 in the Glenwood Canyon area is a recent and vivid example of the widespread problems that can ensue from a natural hazard incident in a major transportation corridor.

The world-class recreational areas of Grand County are among the most popular in the state, and are naturally impacted by severe winter storms. Skiers, hikers, snowmobilers, and snowshoers are sometimes trapped deep in the wilderness by sudden climate changes. When these victims are stranded in remote areas, rescue personnel can be endangered and expensive supplies and specialized equipment are sometimes needed for appropriate response.

Winter Storms - Historical Information

In 2003, Grand County was one of 29 Colorado counties that experienced a Presidential Emergency declaration due to the massive winter storm of March 16-20. This declaration was the only recorded one of its kind to impact the county, but it underscores the potential such Winter Storms have to significantly affect residents, critical infrastructure, and services as discussed in the Risk Assessment section of this report. According to the Colorado Department of Local Affairs, 181 "heavy snow" events were recorded in Grand County between 1993 and 2004.

Grand County's emergency experts provided information about winter storms for the PDMP that extended back many years, two of which are described below in some detail. Based on their collective experiences, it was estimated that winter storms, characterized in the county by "Accident Alert" designations, generally close Highways 40 and 9 approximately twice each season. Highway 40 is a major transportation artery running through Grand County. But despite its occasional closure during severe winter storms, county officials characterize the community as adequately prepared.

The most common causes of road closures are avalanches, drifting snow, and ice. Aside from the winter storm event of March, 2003, some other memorable winter storm events are listed below:

Historical Event 1:

On January 17, 1998, a Blizzard that did not end until the next day struck Grand County, among other Colorado mountain areas. Heavy snow and high winds pounded the northern mountains as well as portions of Middle Park as a vigorous strong storm system moved through the area. Sustained winds from 30 to 50 mph were common, causing whiteout conditions. Blizzard conditions developed above 10,000 feet with winds gusting to near 100 mph, and peak wind gusts to 98 mph were recorded at the Winter Park ski area. The combination of heavy snow and high wind triggered numerous avalanches which blocked roads and highways. Berthoud Pass was closed and scores of travelers had to seek shelter overnight until roads and highways could be cleared and avalanche control operations completed the following day. Snowfall totals included 16 inches at the Eisenhower Tunnel, 12 inches 12 miles west of Walden and 11 inches at Grand Lake. Elsewhere, snowfall generally ranged from 6 to 9 inches.

Historical Event 2:

From January 6 through 9, 1993, an upper level storm moved across Colorado and combined with abundant moisture to produce heavy snow for much of the state. Snow began early on the 6th over the mountains and west. The snow began falling over the

eastern plains on the 8th, and continued until the early morning hours of the 9th. The snow dumped up to 3 feet over the mountains and nearly a foot over the lower elevations. Mountain snowfall totals included 19.5 inches at Mary Jane ski area and 15 inches at Winter Park. There were no fatalities or injuries reported. Property losses, if any, were not available.

TRANSPORTED HAZARDOUS MATERIALS (HAZMAT)

FEMA defines Hazardous Materials as chemical substances that, if released or misused, can pose a threat to the environment or health. These chemicals are used in industry, agriculture, medicine, research, and consumer goods and come in the form of explosives, flammable and combustible substances, poisons, and radioactive materials. According to information from the Colorado Division of Emergency Management, the Environmental Protection Agency sorts HAZMAT into these categories: toxic agents, hazardous wastes, toxic pollutants, hazardous substances, and extremely hazardous substances. The U.S. Department of Transportation uses these categories: explosive; blasting agent; flammable liquid; flammable solid; oxidizer; organic peroxide; corrosive material; compressed gas; flammable compressed gas; poison; irritating materials; inhalation hazard; etiological agent; radioactive materials; and other regulated material. These substances are most often released as a result of transportation accidents or because of chemical accidents in plants, but the risks are reduced significantly when these substances are used in the controlled environment for which they are intended.

According to the Colorado Department of Public Health and Environment (CDPHE), HAZMAT transportation events are those which involve ground, rail, water, air, or pipeline transport and occur outside the boundaries of a fixed-facility. Also included as transportation events are the releases which are discovered upon offloading at a fixed-facility, but which happened during transportation of the materials.

FEMA figures from 1997 period indicated that approximately 6,774 HAZMAT events occurred nationwide. About 5,517 were highway incidents, 991 were railroad incidents, and 266 were attributed to other causes.

In 2004, a total of 179 events were reported in Colorado, and a total of 54 (30.2%) events occurred in fixed facilities. Of the 125 transportation-related events, 120 (96.0%) occurred during ground transport (e.g., truck, van, or tractor) and 4 (3.2%) involved transport by rail (Figure 2). Only one event involved pipeline transportation mode. Most (91.2%) ground transportation events involved trucks. The largest proportions of transportation-related events occurred due to releases en route that were later discovered at fixed facilities (51 [40.8%]) and from a moving vehicle or vessel (37 [29.6%]). Of the 125 transportation-related events, 36 (28.8%) involved a release that occurred during loading/unloading of a stationary vehicle or vessel.

In 166 (92.7%) events, only one substance was released. The most commonly reported categories of substances were acids, volatile organic compounds, and other. During this reporting period, 21 events (11.7% of all reported events) resulted in a total of 58 victims, of whom 3 (5.2%) died. The most frequently reported injuries were headache, respiratory irritation, and trauma. Evacuations were ordered for 11 (6.1%) events.

HAZMAT incidents consist of solid, liquid, and/or gaseous contaminants that are released from fixed or mobile containers and can be caused by intentional terrorist attacks or by accidents. A HAZMAT incident may last for hours, days, or longer, depending on the nature of the release. In addition to the primary release, explosions and/or fires can result from a

release, and contaminants can be extended beyond the initial area by persons, vehicles, water, wind, and wildlife.

HAZMAT incidents also occur as a result of natural hazard events such as floods, hurricanes, tornadoes, and earthquakes, which in addition to triggering a HAZMAT incident can also hinder response efforts. For example, Hurricane Floyd in September 1999 caused communities along the Eastern United States to be faced with flooded junkyards, disturbed cemeteries, deceased livestock, floating propane tanks, uncontrolled fertilizer spills, and a variety of other environmental pollutants that caused widespread concern. This unhealthy scenario was repeated in areas of Florida during the series of consecutive severe hurricanes that struck the state during 2004.

Hazardous materials in transport are especially vulnerable to sabotage or misuse and, in the wrong hands, pose a significant security threat. The security of hazardous materials in transportation poses unique challenges as compared to security at fixed facilities because of the changing environment surrounding a moving vehicle. Most hazardous materials are frequently transported in large quantities, and once mobile, they are particularly susceptible to theft, interception, detonation, or release. When transported in proximity to large population centers, accidental or intentional acts could have serious consequences.

When hazardous materials are not controlled due to improper use or accidents, they can quickly create a dangerous and/or life-threatening situation. Because of the mountainous terrain found throughout the Grand County area, the potential for accidents involving transported hazardous materials is very real.

The CSP designates Hazmat routes. Colorado 9 from US 40 in Kremmling to Interstate 70 in Silverthorne is so designated.

HAZMAT - Historical Information

According to figures from CDPHE, Grand County reported four HazMat incidents between the years 1993-2004, with no resulting injuries. This experience contrasts starkly with that of Adams County, which reported 1,592 incidents during the same period. But as noted in the Colorado HazMat route map below, Grand County is crisscrossed by HazMat routes which, combined with mountain terrain and periodic winter storms, create a regular potential for transported incidents.

Historical Event 1:

The planning team reported a transportation event that occurred during the summer of 2005 (prior to the availability of statistics for the current reporting period of CDPHE), when a tanker truck carrying magnesium chloride overturned at US 40 and US 34. No injuries resulted from the accident, but the highways were snarled for hours.

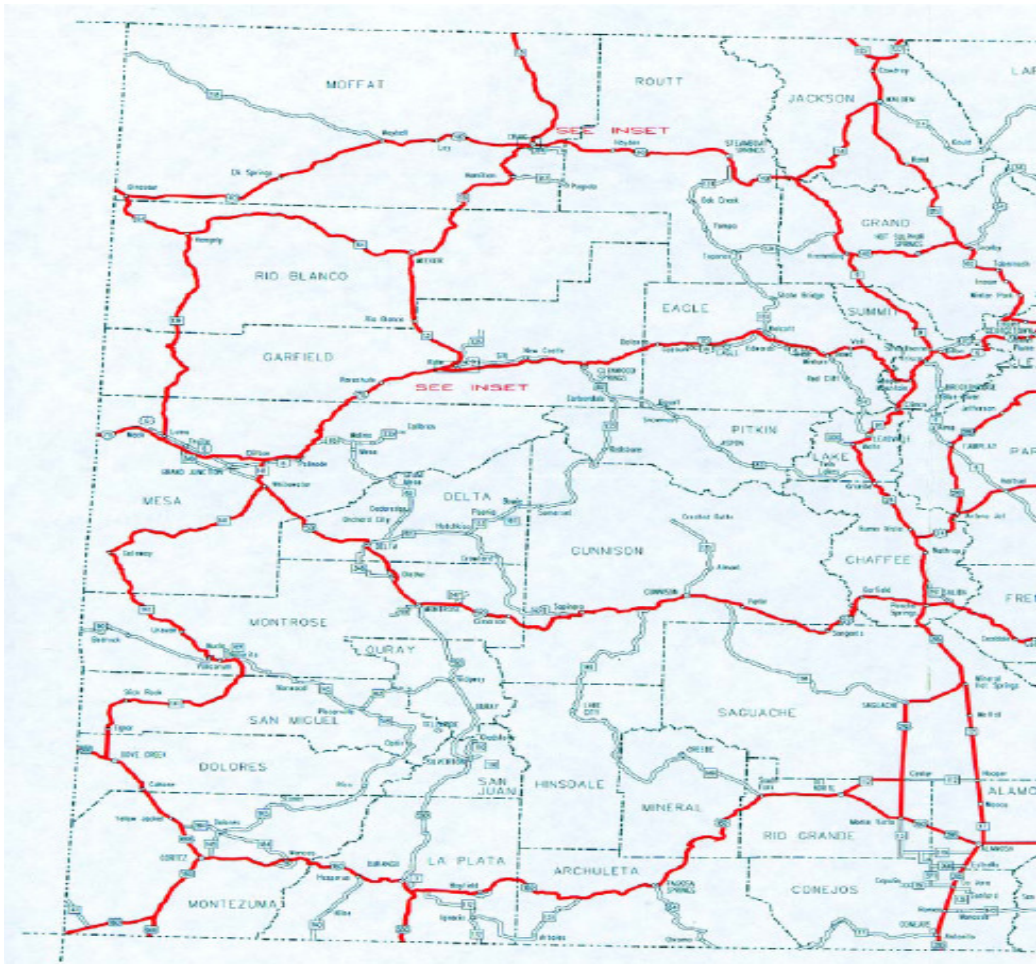


Figure 1: Geographic Distribution of Events by County



LANDSLIDES/ROCKSLIDES

Landslides, including rock fall and other debris flow, as a natural hazard exist in almost every state in the United States, and are a serious geologic hazard. They sometimes present a threat to human life, but most often result in a disruption of everyday services, including emergency response capabilities. Landslides and rockslides can and do block transportation routes, dam creeks, and drainages and contaminate water supplies. When these hazards affect transportation routes, they are frequently expensive to clean-up and can have significant economic impact to Grand County.



FEMA describes debris flows, sometimes referred to as mudslides, mudflows, lahars, or debris avalanches, as common types of fast-moving landslides. These flows most frequently occur during or after periods of intense rainfall or rapid snow melt. They typically start on steep hillsides as shallow flows that liquefy and accelerate to speeds of about 10 miles per hour, but that can exceed 35 miles per hour in more extreme cases. Debris flows have a consistency ranging from watery mud to thick, rocky mud that can carry large items such as boulders, trees, and cars and can damage road surfaces. Flows from many different sources can combine in channels and increase in destructive power. These

flows continue and grow in volume with the addition of water, sand, mud, boulders, trees, and other materials. When the flows reach flatter ground, the debris spreads over a broad area, sometimes accumulating in thick deposits that can wreak havoc and cause significant destruction in developed areas.

Wildfires sometimes lead to destructive debris-flow activity. In July 1994, the notorious wildfire on Storm King Mountain, west of Glenwood Springs, Colorado, stripped the slopes of vegetation and killed many firefighters. Heavy rains on the mountain during the following September resulted in numerous debris flows, one of which blocked Interstate 70 and threatened to dam the Colorado River.

Rockfalls, sinkholes, subsidence, swelling, or expansive soils and debris flows are geologic hazards related to landslides.

In 2002, an update to Colorado's Landslide plan was completed, and it identified several areas of vulnerability in Grand County. Colorado's plan compiled these areas into different priorities described in three distinct categories or tiers based upon the criticality of the threat. The three categories are further described as:

- Tier One listings are serious cases needing immediate or ongoing action or attention because of the severity of potential impacts.
- Tier Two listings are very significant but less severe; or where adequate information and/or some mitigation actions have taken place; or where current development pressures are less extreme.
- Tier Three listings are similar to Tier Two but with less severe consequences or primarily local impact.

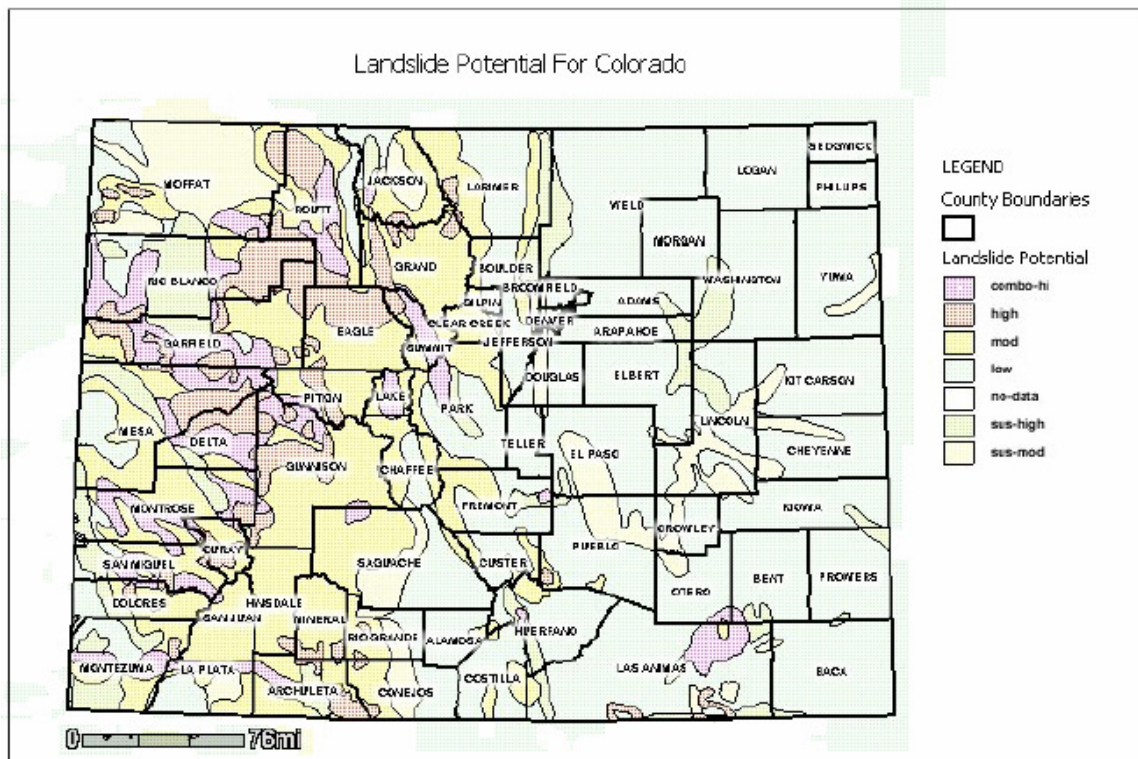
Grand County faces its share of landslide-related problems, especially in the western part of the county. Most of the county overall is rated a "medium" level landslide hazard area according to the state map and, despite conscientious land use planning, concerns still exist. Examples of Historical problems, some of which continue to this day, are set forth below:

Grand County Pre-Disaster Mitigation Plan

Historical Incident: Fraser Canyon (AMTRAK) landslide area

The Fraser Canyon corridor was for years a high risk area for landslides, and on April 16, 1985, that area experienced a significant slide that undercut the embankment and railroad tracks. Because of the ensuing damage, a 14-car Amtrak passenger train was derailed and two locomotives and five passenger cars were thrown into the resulting breach. There were no fatalities, but 26 people were injured and damage was estimated at \$3.4 million. The landslide was extensively investigated and repairs were made by the railroad immediately following the incident. An alarm fence was installed along all potential landslide areas of the railroad in Fraser Canyon.

This incident provided a vivid illustration of the serious potential consequences of even a small, but strategically located slope failure (the volume of the April, 1985 slide was estimated to be about 4,000 cubic yards, small by many standards of such activity). Due to the property losses and the potential for multiple fatalities, this landslide area was aggressively mitigated immediately after the incident. The Fraser Canyon site was selected for a Priority List maintained by the Colorado Geological Survey to exemplify the vulnerability of major rail transportation corridors that are constrained to the narrow floors of Colorado's many hazardous canyons. In these areas, the consequences of landslides, rock fall, or snow avalanches are so severe that extreme measures of mitigation and surveillance are a necessity. This is especially sobering as we approach 2008, since Colorado faces the prospect of high level radioactive waste being transported across the state by both rail and highway.



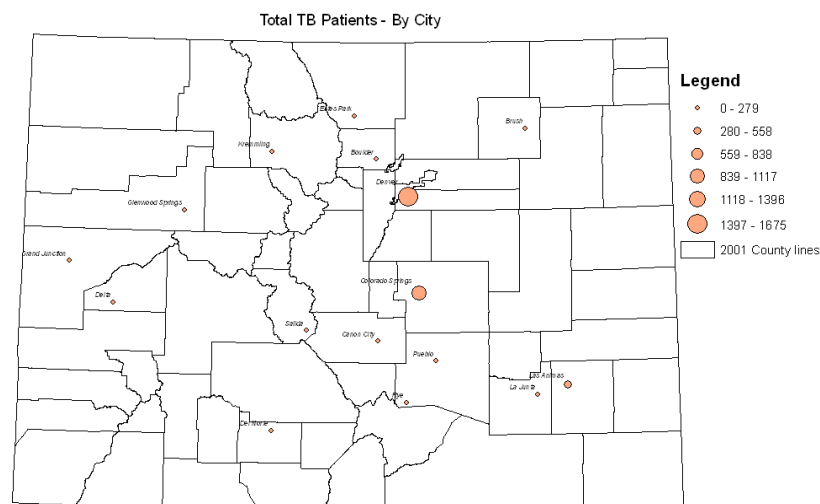
DISEASE OUTBREAK

The epidemic hazard for humans may be considered somewhat greater than that of most other communities in the state due to the steady stream of visitors to Grand County. Many of these visitors travel frequently and widely. Fortunately, there has been no major disease outbreak in the area in recent memory. Further, the county and municipalities have implemented contingency plans and protocols to enable rapid response to, and control of, outbreaks if identified.

Data was not available to estimate losses associated with the epidemic hazard for humans in the Grand County area; however, all persons who reside in the area are theoretically at some risk of developing a disease in the event that an outbreak occurs. Damages and losses that might accompany the epidemic hazard as related to human disease outbreak are primarily limited to effects on human populations and health and would not typically affect structures, utilities, or transportation. Impacts on public health and safety facilities could occur, but some structures, furnishings, and belongings that come into contact with a diseased person may need to be destroyed should these resources be considered infectious.

Primary damages or losses associated with an outbreak or outbreaks could include economic losses associated with work absences or a decrease in productivity due to disease, human losses associated with disease and fatality in the community, adverse impacts on hospitals and other health care facilities and staff, and the fear and anxiety associated with a severe outbreak.

Information about infectious diseases is not plentiful and is most likely due to the relative disease-free situation the county has traditionally enjoyed. It is of passing interest to note however that in 2004 the CDPHE conducted a study and issued a draft report entitled "Locations of Historical TB Sanatoriums in Colorado and Possible Relationships with the Current Distribution of Asthma Cases," which included a map showing a number of tuberculosis patients located in the Kremmling area. An outbreak of tuberculosis is not a major concern for the planning group.



Pertussis

While the planning group is not especially concerned about tuberculosis outbreaks, they do consider pertussis to be a more serious threat to the residents of Grand County. Pertussis, more commonly known as whooping cough, is a contagious disease that can cause a prolonged and sometimes severe cough illness. It is caused by the bacterium *Bordetella pertussis* and is found in the nose and throat of an infected person. An infected person sometimes has coughing episodes that can end in vomiting or cause a "whoop" sound when the person breathes in air. Pertussis can occur at any age, but severe illness is more common in infants and young children who have not been immunized. Symptoms appear usually 7 to 10 days after exposure. Certain antibiotics may help prevent or lessen the disease, and pertussis can be prevented in children by immunizing them in early infancy. Vaccine-induced immunity wanes among older children. At least 3 doses are necessary to protect a child from pertussis.

In a November, 2006 update from CDPHE, Grand County health officials reported 7 cases of pertussis syndrome during 2005. This compares to 10 reported in 2004, and 21 in 2003. The chart below provides more detail:

Pertussis In Grand County*				
Year	No. of Cases	Rate	Comments	No. of cases in State
2001	0			389
2002	0			464
2003	21	NA		368
2004	12	87.4**	3rd highest rate in State	1185
2005	7	NA		1391

*From CDPHE website: <http://www.cdphe.state.co.us/dc/CODiseaseStatistics/index.html>

** See 2004 Pertussis Stats

Pandemic Influenza

Influenza is a highly contagious respiratory virus that is responsible for 36,000 deaths in the United States each year. 5-20% of the populations are sick with the flu each year; it causes over 200, 000 hospitalizations each year.

Every year the influenza virus makes minor changes in the genetic pattern as the virus replicates. This is called Antigenic drift. An annual flu shot is needed because of this mutation each year.

An Antigenic shift is a major change in the virus that causes a new subtype of virus to develop. This virus is new to humans. Therefore, no humans have any immunity to the virus. This new virus has the potential to start a Pandemic or worldwide outbreak of influenza.

This Antigenic Shift is one of two ways that Pandemic Viruses develop. The other way is through wild birds. The influenza virus has the ability to infect these wild birds who then serve as reservoirs for the virus. The Avian Flu or Bird Flu is of concern now; specifically the H5N1 virus. This virus has infected many chickens in Asia, and has been 100% fatal to chickens. Ducks and Geese serve as a reservoir, passing the virus along to other birds. When the virus adapts and finds the ability to infect humans, and can be efficiently transmitted human to human, concern about Pandemic Influenza is raised.

Grand County Pre-Disaster Mitigation Plan

This new virus also means that new vaccines must be developed to protect humans from the disease. This process of creating a new vaccine can take months to years to prepare and distribute.

During the 20th century, three pandemics occurred. In 1918, the "Spanish Flu" killed approximately 40 million people world wide and 675,000 in the United States. This particular flu virus was very potent and killed young healthy adults. (Chart below) In 1918, citizens and the country were more self-sufficient and traveled less by slower means; communication was slow; there were fewer people and they had fewer contacts; households were more crowded; and households stockpiled food. They were also unprepared for such a horrific disease. In 2006, citizens and the country travel more and by more rapid means and communicate constantly. Increased population means more personal contact; households aren't as crowded; very little stockpiling of food and supplies take place with more "on-demand" buying. There are more elderly immune-compromised people in the population. The preparedness for such horrific diseases still requires improvement.

Grand County 1918 Deaths				
Month	No. of deaths	Cause		Ages
Jan	1	Still born		
Feb	1	Asphyxiation		
March	1	Angina		
April	1	TB		
May	2	Pneumonia	Apoplexy	
June	2	Heart	Pneumonia	
July	2	Concussion	Heart	
August	0			
September	1	Brain Bleed		
October	6	Pneumonia, Asthma	Influenza. Spanish Flu	33,19,26,66,65,34
November	1	Pneumonia	influenza	29
December	1	Angina		
Total Deaths	19			

In 1957-58, the "Asian Flu", killed approximately 4 million people worldwide and 70,000 in the US. In 1968-69, the "Hong Kong" flu killed approximately 4 million people worldwide and 34,000 in the US.

The scientific community and the worldwide public health community are concerned about the potential for a pandemic from the H5N1 virus. It is inevitable that a pandemic will occur, but it is not known when it will occur.

The Centers for Disease Control estimates that anywhere from 90 million to 200 million people could become ill from the flu in the next pandemic in the US alone. They also estimate up to 1.9 million deaths. These estimates would overwhelm the health care system in the US.

In Grand County, these numbers could range anywhere from 4,000 ill, with 2,000 of those seeking health care. Deaths are estimated at 10-100 but it depends on the specific

virulence of the virus. In a county of approximately 13,500, with six medical facilities, one county nursing service, and an EMS system that covers all 1800 square miles, the system would be overloaded immediately.

The economic impact of Pandemic influenza is dependent on several factors: the attack and fatality rates of the disease; the duration of the pandemic; the behavior and preparedness of households and businesses; the capacity and preparedness of health care systems. All of these factors are relative unknowns at this time, but they can be influenced through plan preparation and public education.

Supply and demand will also affect the economy during a pandemic. The supply side will be affected by social isolation and quarantine, absenteeism, the disruption of essential services, telecommuting, and caring for sick family and friends. The supply side will also be affected by disruptions in transport, trade, payment systems, and major utilities services. The demand side will be affected by decreased spending and investing. If a severe pandemic like that of 1918 occurs, the long term impacts will influence tourism and exports, and trade and transportation restrictions may be enacted. In short, the global financial system will be severely damaged.

There are several assumptions that accompany the pandemic scenario.

- Localities must be prepared to rely on their own resources to respond. The effect of influenza on individual communities will be relatively prolonged (weeks to months) in comparison to other types of disasters.
- Health care workers and other first responders may be at higher risk of exposure and illness than the general population, further straining the health care system.
- Outbreaks can be expected to occur simultaneously throughout much of the U.S., preventing shifts in human and material resources that usually occur in response to other disasters.
- Of those who become ill with influenza, 50% will seek outpatient medical care.
- The typical incubation period (interval between infection and onset of symptoms) for influenza is two days.
- Persons who become ill may "shed" the virus and can transmit infection for up to one day before the onset of illness. Viral shedding and the risk of transmission will be greatest during the first two days of illness. Children usually shed the greatest amount of virus and therefore are likely to pose the greatest risk for transmission.
- On average, infected persons will transmit the infection to approximately two other people.
- In an infected community, a pandemic outbreak will last about six to eight weeks.
- Multiple waves (periods during which community outbreaks occur across the country) of illness could occur with each wave lasting 2-3 months. Historically, the largest waves have occurred in the fall and winter, but the seasonality of a pandemic cannot be predicted with certainty.
- Effective prevention and therapeutic measures, including vaccine and antiviral agents, will be delayed and in short supply.
- Widespread illness in the community could increase the likelihood of sudden and potentially significant shortages of personnel in other sectors that provide critical public safety services.

In addition to the hazards enumerated above, Grand County considered Lightning/Thunderstorms and Drought as two hazards that should be ranked next in terms of priority concerns. Following those, the other hazards are listed in no specific order of priority.

LIGHTNING / THUNDERSTORMS

According to experts in the field of natural hazards, lightning is the most dangerous and frequently-encountered weather hazard that most people experience each year. It is the second most frequent weather-related killer in the United States with nearly 100 deaths and 500 injuries each year. (Floods and flash floods are the number one cause of weather related deaths in the US). According to the National Oceanic and Atmospheric Administration (NOAA), an average of 67 people in the United States are killed each year by lightning, which is typically more than the numbers killed annually by tornadoes or hurricanes. It should be noted that these figures experienced a deadly exception in 2005 due to the devastation of Hurricane Katrina.

In 2004, 32 deaths were caused by lightning, down from 44 the prior year thanks in part to increased education and safety. Unfortunately, many who are struck by lightning survive with a variety of long-term, debilitating symptoms, including memory loss, attention deficits, sleep disorders, numbness, dizziness, stiffness in joints, irritability, fatigue, weakness, muscle spasms, depression, and an inability to sit for long.

Lightning is the leading summer weather-related killer in Colorado. Hikers and climbers in the mountains of Grand County who are caught in lightning storms are in particular danger, as are children at play in open areas. While lightning frequently accompanies



thunderstorms, the presence of a thunderstorm is not necessary for lightning to occur. Lightning can strike as far away as 10 miles from any precipitation. Tourists who travel to the region are often surprised by the speed with which a thunderstorm can build in the mountains, and they can easily be caught in a storm while traveling in Grand County.

Late spring and summer thunderstorms sometimes appear quickly and depart rapidly, while leaving behind evidence of their brief existence. Heavy rains can trigger another hazard, flash flooding, which washes out roads and disrupts transportation routes. Lightning often sparks isolated fires, or "hot spots", that leave firefighters scrambling to contain before they spread. Hailstorms from the storms can damage structures and property in the area.

Notwithstanding the comparative frequency of lightning strikes in Colorado, Grand County is not considered an especially high risk area as are, for example, sections of El Paso and Larimer Counties, or even areas of moderate risk such as sections of Adams, Arapahoe, Boulder, Douglas, Elbert, Fremont, Jefferson, La Plata, Las Animas, Lincoln, Mesa, Moffat, Montezuma, Park, Pueblo, Rio Blanco, Routt and Weld Grand Counties.

Historical Event 3:

On July 3, 2006, a lightning strike occurred at Grand Elk Golf Course, causing injuries to one person. CPR was performed on the male victim who was taken to a hospital. He survived the lightning strike.

Historical Event 4:

A July 2006 lightning strike at Pole Creek Golf Course destroyed a golf bag and equipment, but no persons were injured.

DROUGHT

Drought is a naturally occurring climatic condition caused by an extended period of limited rainfall in a broad geographic area. High temperatures, high winds, and low humidity can worsen drought conditions and can make areas more susceptible to wildfire. Human demands and actions sometimes hasten Drought-related impacts. Droughts are frequently classified as one of four types:

- Meteorological
- Agricultural
- Hydrological
- Socio-economic

Meteorological droughts are typically defined by the level of “dryness,” wherein actual precipitation is less than the normal amount of precipitation over a certain period of time. *Agricultural droughts* are based on deficiencies in soil moisture relative to the demands of plant life. Emphasis tends to be placed on factors such as soil water deficits, water needs based on differing stages of crop development, and water reservoir levels. *Hydrological drought* is directly related to the effect of precipitation shortages on surface and groundwater supplies. Human factors, such as changes in land use, sometimes alter the hydrologic characteristics of a basin. *Socio-economic drought* is the result of water shortages that limit the ability to supply water-dependent products in the marketplace.

Drought has played a prominent role in Colorado’s history, and it is one of the most destructive, but least understood, of all natural hazards. Its onset is slow and silent and its effects can last for years. Geographically, drought can occur locally, regionally, or statewide. The impacts from drought are non-structural and generally affect the economy and environment of the afflicted area. A drought event can be short-term or a multi-year event, much like the drought that has recently affected Colorado in the past several years. From a Historical perspective, scientific studies have shown that Colorado has experienced drought periods lasting ten years and longer. Research suggests that multi-year droughts typically have one peak year that is more dramatic and more devastating than all of the others. Recorded information suggests that 2002 was the peak year of the current drought event.

The risk of a drought is uniform across the Grand County area. Annual precipitation is fairly consistent across the region with variations occurring as the topography changes from mountain to valley floors. The different areas of Grand County receive an average of about 13 to 20 inches of moisture a year. With such a small amount of annual precipitation, any decrease in moisture over a multiyear period can negatively impact the region. Along with individual residents, the tourism and recreation industries can be disrupted by a drought at a parcel level. A portion of Grand County relies on individual ground wells and constructed

water retention structures for their water resources. Ground wells service a significant portion of the population, while local ranchers rely upon ponds and ditches for livestock and crops. Overall, the area has over 20,000 well permits as of July 1, 2003.

The Fraser River flows north about 28 miles from the headwaters near the Continental Divide, through the towns of Winter Park, Fraser, Tabernash, and Granby, and is one of the major tributaries to the Upper Colorado River. Increasing urban development, as well as the seasonal influx of tourists, is placing more demands on the water resources in the Fraser River watershed. According to the state's Economic Impact Task Force Report on the Economic Impact of Drought (April 30, 2002), Grand County is part of the region which includes Summit, Grand, Pitkin and Jackson counties, and is highly dependent upon tourism. These counties receive 76% of their income and 51% of their jobs from tourism, and the effects of drought can severely diminish tourism revenues in these areas.

Grand County was declared a disaster area by the USDA due to drought in 2000 and 2002.

Historical Event: The Drought of 2002

The drought of 2002 was the culmination of a severe lack of snowfall statewide during the preceding winter combined with abnormally low precipitation for several prior years. By April 2002, statewide snow pack was only about 52% of average, and general precipitation was well below the 70% average that is commonly used to define a severe drought. This continued the pattern of the previous 4 years in Colorado which was also below normal precipitation amounts. The highly anticipated spring precipitation never met expectations and warming temperatures caused the remaining snow pack to diminish rapidly.

The severity of the drought had a devastating effect on the state and local economies. Colorado's economy suffered an estimated \$1.1 billion impact on agriculture, tourism, and recreation. Ranchers in southern Colorado sold 80% of their herds due to lack of water, outfitters estimated recreational visitation was down 40%, and fishing licenses sales were down by 93,000. This decline had a \$1.8 million impact on the state's Division of Wildlife.

Within Grand County, drought effects were quite visible. Snowfall was well below normal and this negatively affected the local ski industry and tourism. The Winter Park ski resort experienced a decline in general lift tickets sold, and visits by season tickets holders experienced a drop off. The lack of snow pack caused rivers in the area to run well below normal water levels, thus the normal levels of summer tourism dropped as well. The low water, in addition to the nationally publicized drought, caused the cancellation of many pre-planned river trips and tourism to the region. Rafting trips in Grand County declined significantly.

The numerous summertime visitors to the area come for camping, hiking, fishing, and biking activities. Many of the visitors are in-state residents of Colorado, and they enjoy a variety of campgrounds for long weekends and brief getaways. The drought of 2002 caused the region to go into a full fire ban and many campgrounds and forest areas were closed to the public. These measures predictably deterred many would-be tourists from the region and their tourist dollars were spent elsewhere.

OTHER HAZARDS

To conform to FEMA's guidance for PDMP development and to consider all relevant hazards with potential impact on Grand County, the planning team reviewed a comprehensive list of hazards in addition to those prioritized by risk assessment activities. Those other hazards considered by the planning team include:

Grand County Pre-Disaster Mitigation Plan

- Flooding (flash and seasonal floods)
- Avalanche
- High Winds/Tornado
- Earthquake
- Volcanic Eruption
- Asteroid/Comet
- Terrorism – International and Domestic
- Airplane Crashes
- Jail/Prison Escapes
- Civil Disturbance
- Flood due to Human Involvement
- Military Accidents
- Arson
- Urban Fire (Accidental)
- Extreme Acts of Violence (e.g., the 2004 “Granby Incident”)
- Hazardous Materials – Fixed Installations
- Motor Vehicle Accidents

FLOODING (INCLUDING FLASH AND SEASONAL FLOODING)

According to NOAA, flash floods in the United States are responsible for more deaths than any other weather phenomena. Year to year in Colorado, only lightning is more deadly.

Flash flooding usually is the byproduct of very heavy rains in a short period of time over a small geographic area, all of which combine to cause normally small streams to turn violent.



Flooding as a natural hazard is a problem for Grand County, and the extreme terrain in the area increases the potential for severe flooding. Seasonal flooding occurs in Grand County during the spring when the mountain snow pack starts its melting process and heavy rainfall sometimes combines with the runoff and causes some rivers and streams to swell out of their banks. These seasonal floods typically begin as spring runoff appears, after the first spring warming trend. If the trend persists for up to 8-10 consecutive days in a basin where the snow pack has elevated water

content, serious flooding can ensue. The total duration of snowmelt floods is usually over a period of weeks rather than days. They yield a larger total volume in comparison to other varieties of floods in Colorado. Peak flows are generally not as high as flows for the other types of floods. A single cold day or cold front can interrupt a melting cycle causing the rising water to decline and stabilize until the cycle can begin again. Once snowmelt floods have peaked, the daily decreases are moderate, but fairly constant. Snowmelt flooding usually occurs in May, June, and early July.

As a condition to participating in the National Flood Insurance Program (NFIP), each participant has committed to restrict the building of structures in the flood-hazard areas delineated by FEMA FIRM (Flood-Insurance-Rate Map) panels. This approach somewhat minimizes the participant's vulnerability to flood damages to existing structures. In Grand County, the towns of Fraser, Grand Lake, and Winter Park currently participate in the NFIP. The county itself does not participate in NFIP because it believes that its current building restrictions that prohibit new construction in unincorporated flood plain areas offer its residents adequate protection.

Some flooding can be predicted by weather reports, but many times smaller flash floods are a result of a microburst system, which overwhelms both natural and constructed drainage systems. Such failures often cause excessive damage to towns, industry, and farms in the floodplain areas. Emergency services, transportation, power, water and wastewater services, and business and hazardous material storage can be substantially disrupted, which can affect the population located in or near the flooded area.

According to the state's 2004 hazard mitigation plan, 192 residents in 80 properties, all but one of which were 1-4 family dwelling units, were living within a flood plain in Grand County.

Historical Event 1:

FEMA flood-related statistics show that the town of Winter Park suffered a loss of nearly \$6 million in a flood-related event sometime after 1978. The precise date and circumstances of this event are not known.

Historical Event 2:

On July 20, 2000, heavy rain, up to 3.5 inches in an hour, deluged the streets, drains, homes, and businesses in Granby. In many places, water was gushing out of the storm drains because the drainage system could not handle the high volume of water. Some hillsides were washed out and many yards had surface soil stripped clean. Water up to 2 feet in depth covered some of the cities' streets. Several offices and businesses were also flooded. The Granby Library, in the basement of Granby Town Hall, was also flooded. Numerous books and computers were damaged, forcing the closure of the library for a week.

Grand County is home to a number of dams, damage to which could prove to be severely disruptive and even deadly to county residents, as well as others. For example, failure of Granby Dam, located in Grand County, would inundate Interstate 70 and U.S. 6 & 24 from DeBeque to Palisade in Mesa County.

Class I and Class II dams are defined as follows:

Class I:

A dam shall be placed in Class I when failure would result in probable loss of human life.

Class II:

Significant damage is expected, but not loss of human life. The phrase "Significant damage" refers to structural damage where humans live, work, or recreate, or to public or private facilities exclusive of unpaved roads and picnic areas. "Damage" refers to rendering these structures uninhabitable or inoperable.

Grand County has a total of nine Class I and nine Class II dams.

AVALANCHE

Avalanches are a type of slope failure that sometimes occurs on grades steeper than about 20 to 30 degrees. Avalanches can reach speeds of 200 miles per hour and can potentially exert enough force to destroy buildings and uproot large and healthy trees. Avalanche-prone areas can be determined with some accuracy, since under normal circumstances avalanches tend to run down the same paths year after year. But exceptional weather conditions sometimes produce avalanches that overrun normal path boundaries or create new paths. Unlike other forms of slope failure, snow avalanches can build up and be triggered on more than one occasion during a single winter season.

From 1950 to 2003, Colorado experienced more than double the number of avalanche-related fatalities as the next most dangerous state. Grand County has conditions that are conducive to avalanche, and avalanches have occurred during the winter as a result of heavy snow accumulation on steep slopes. From 1985-86 to 2003-04, 114 people were killed throughout Colorado by avalanches and, since 1950, Grand County reported 7 fatalities, with the most recent occurring in November, 2005.

Avalanches are a very significant threat as development and recreation increase in mountain areas. Data shows that avalanche incidences have increased, as has the number of people affected by these events. Information from avalanche accidents shows that such hazards occur in about one-third of the states, and most significantly in much of the West, where avalanches are the most frequently occurring lethal form of mass movement. Mortality due to snow avalanches exceeds the average mortality due to earthquakes and all other forms of slope failure combined on an annual basis. On some occasions, avalanches pose hazards that affect a significant sector of the public, involve a number of private organizations, and require cooperation and action by government agencies at the federal, state, and local levels. The avalanche hazard causes economic loss to residents, businesses, transportation systems, and government agencies and can have a negative impact on the local economy of many mountain regions.

Many areas of Grand County are considered especially susceptible to avalanche activity. Many of the annual visitors to these areas travel into the backcountry ill-equipped and without an adequate appreciation for the dangers that avalanches pose. The rescue and recovery of those caught in avalanches can be a labor-intensive and dangerous task for the emergency personnel involved. In general, the amount of personnel in the rescue efforts can far exceed the number of people who are caught in the avalanche.

Colorado Fatalities by County					
Northern Mtns.		Central Mtns.		Southern Mtns.	
Summit	33	Pitkin	33	Ouray	12
Clear Creek	21	Gunnison	17	San Miguel	10
Eagle	9	Chaffee	11	San Juan	5
Grand	6	Lake	11	Mineral	4
Larimer	6	Mesa	2	La Plata	2
Boulder	5	El Paso	1	Conejos	1
Routt	2	Garfield	1	Dolores	1
Jackson	2	Total	76	Hinsdale	1
Rio Blanco	1			Montezuma	1
Total	85			Total	37
Colorado Avalanche Information Center			1950/51 to 2002/03		

Historical Event 1: Berthoud Pass, Grand County

A day of outdoor recreation turned to tragedy on March 1, 1998, when a 20-year-old backcountry snowboarder was buried and killed in a sizable slab avalanche on the south and east side of Berthoud Pass in Colorado. The victim and a skier friend triggered the avalanche as they skied down a steep backcountry area above treeline known as the Russell Face.

The two men used snowshoes to hike westward from the summit of Berthoud Pass toward the Continental Divide. They were only 3-4 turns down the slope when it fractured. The victim was swept down and buried under about two feet of snow. His partner had his skis knocked off his feet which likely allowed him to stay on the surface. When the avalanche stopped, he briefly searched for his buried friend. But since they carried no avalanche rescue gear, he started hiking out to the highway where he flagged down a motorist. The Berthoud Pass Ski Patrol responded with support from the Alpine Rescue Team and the Loveland Ski Areas ski patrol. The victim was quickly found and CPR was started, but the almost 2 hour burial was too long for him to survive.

Historical Event 2: Berthoud Pass, Grand County

Two snowshoers were injured, one critically, on Berthoud Pass on April 19, 1998... It is unclear at this time if the critically injured woman was actually caught in the slide or fell down the steep slope trying to get to her partner who had an injured shoulder. Also, one rescuer triggered a small slide trying to get to them.

Two skiers triggered a slide on the Stanley avalanche path that stopped just short of Highway 40 on the east side of Berthoud Pass. Later that day, a skier triggered an avalanche near the Loveland Ski Area. A few natural events were also spotted along the I-70 corridor. These slides ranged from 6" to 3-6' deep and were on east-southeast aspects near & above timberline. Avalanche control on the east side of the 10-Mile Range near Breckenridge also produced shallow slabs from recent drifting above treeline. The recent new snow and windloading were the main reasons for these slides. A thin, weak layer of dry snow that was overlaid with a shallow wind slab appeared to be the main ingredient for the instability.

Historical Event 3: Berthoud Pass, Grand County

On November 6, 2005, a backcountry snowboarder -- a Denver man and a long-time rider in the Berthoud Pass area -- and his dog were buried and killed in a sizable hard slab avalanche on the north side of Mines Peak, just northeast of the summit of Berthoud Pass. This was the first Colorado and US avalanche fatality of the season.

HIGH WINDS / TORNADO

The Grand County area is subject to frequent, often intense gusts of high winds. Although they are not usually life-threatening, high winds can disrupt daily activities, cause damage to buildings and other structures, and increase the potential of other hazards. Some areas with little ground cover experience blinding gusts of dust and road debris, which becomes a hazard for travelers and an occasional disruption for local services. High winds in the winter sometimes cause complete whiteouts and create significant snowdrifts and transportation disruptions. High winds can accelerate wildfires, which can cause grave danger to

firefighters, emergency response personnel, and residences or other structures which happen to be in their path.

Damage to structures happens regularly due to high winds, but it is usually minimal and goes unreported. Effects of the high winds may be seen in roof damage, cracked windows, and damage to trees and landscaping.

A tornado is a violent and extreme extension of the high wind hazard, characterized by a twisting, funnel-shaped cloud extending to the ground. In Colorado, tornadoes are most often caused by thunderstorm activity when cool, dry air meets and overrides a layer of warm, moist air. This forces the warm air to rise rapidly. Damage caused by a tornado is the result of the excessive wind velocity and the wind-borne debris it creates. Lightning and large hail is a frequent byproduct of these serious windstorms.

According to the National Weather Service, tornado wind speeds range from 40 to more than 300 miles per hour, and the most violent tornadoes have rotating winds of 250 miles per hour or more and are capable of causing extreme destruction. Typically, tornadoes cause the greatest damages to structures of light construction such as residential homes and, particularly, mobile homes.

Colorado ranks 9th among the 50 states in frequency of tornadoes, but 38th for the number of deaths. Colorado ranks 31st for injuries and 30th for the cost of repairing the damages due to tornadoes. When these statistics are compared to other states by the frequency per square mile, Colorado ranks 28th and 37th for both injuries per area and costs per area.

Between 1950 and 1995, Colorado experienced 1,161 tornadoes, which caused 2 fatalities. The risk of death from tornadoes in Colorado in any one year is 1 in 49,715,910. Between 1950 and 1995, the state had 157 injuries involving tornadoes, and the total cost of their damage was placed at more than \$68 million.

Tornadoes have been reported in nine months of the year in Colorado, with peak occurrences between mid-May through mid-August. June is by far the month with the most recorded tornadoes. Tornadoes occur at all times of the day, with more than half occurring between 3pm and 6pm, and about 88 percent occurring between 1pm and 9pm MDT. The topography of Grand County limits the occurrence of tornadoes in the area, but they can occur statewide, with the greatest number developing in the plains of eastern Colorado to the east of Interstate 25.

According to the state's reports of Windstorm events, 16 reported incidents of high winds occurred in Grand County between January 1, 1993 and July 31, 2000. No deaths or injuries were reported, and damages from the event totaled \$1.7 million.

Examples of high winds and tornadoes in Grand County are plentiful, and the following are just a few of the more recent or prominent ones:

Historical Event 1:

On June 8, 1984, Grand County experienced a category F1 event with winds ranging between 73 and 112 miles per hour. No injuries or deaths were reported. The tornado caused approximately \$2,500 in damages.

Grand County Pre-Disaster Mitigation Plan

Historical Event 2:

On May 9, 2001, winds of at least 60 mph were recorded 10 Miles North of Kremmling. The winds accompanied a subsequent thunderstorm in the area. No injuries, damages, or deaths resulted from this event.

Historical Event 3:

On June 6, 2003, strong winds measured at about 65 mph damaged the roof of West Grand Elementary School in Kremmling. The wind lifted large sections of rolled roofing and Styrofoam insulation off the roof. No injuries or deaths occurred.

Historical Event 4:

Approximately 11 miles north northeast of Kremmling, winds of nearly 60 mph were measured on April 8, 2005. A mixture of a strong gradient wind, coupled with thunderstorm outflow winds, swept across parts of North-Central and Northeast Colorado during the afternoon. The strong wind downed power lines and knocked out electricity to approximately 19,000 customers on the east side of the Denver area. Peak wind reports from around the region included 70 mph in Greeley, 68 mph in Longmont, and 59 mph at Centennial Airport.

Historical Event 5:

The planning team reported that during the spring of 2006, high winds, dust devils, and a reported tornado caused extensive damage to the ball fields at Kremmling.

EARTHQUAKE

An earthquake is the motion or trembling of the ground produced by a sudden displacement of rock in the Earth's crust. Earthquakes often occur as the result of crustal strain, volcano activity, landslides, or the collapse of caverns, and they can affect hundreds of thousands of square miles, cause damage to property measured in the tens of billions of dollars, result in loss of life and injury to hundreds of thousands of persons, and cause major social and economic disruptions.

More than 500 earthquake tremors of magnitude 2.5 or higher have been recorded in Colorado since 1867. More earthquakes of magnitude 2.5 to 3 probably occurred during since that time, but went unreported because of the sparse distribution of population and limited instrumental coverage in much of the state. For comparison, more than 20,500 similar-sized events have been recorded in California during the same time period. The largest known earthquake in Colorado occurred on November 7, 1882 and had an estimated magnitude of 6.5. The location of this earthquake was in the northern Front Range west of Fort Collins.

Relative to other western states, Colorado's earthquake hazard is higher than Kansas or Oklahoma, but lower than Utah, and significantly lower than Nevada and California. Even though the seismic hazard in Colorado is low to moderate, it is likely that future damaging earthquakes will occur. It is reasonable to expect future earthquakes as large as magnitude 6.5 to match the largest recorded event. Calculations based on the Historical earthquake record and geological evidence of recent fault activity suggest that an earthquake of magnitude 6 or greater may be expected somewhere in Colorado every several centuries.

Although no specific information was located for earthquake activity in Grand County, it has some identified and suspected fault areas, which are detailed below:

According to the Colorado Geological Survey, there are at least 11 northwest-striking late Cenozoic faults in the Granby Basin Fault area. The faults lie between the town of Granby and Lake Granby and extend across Granby Mesa and the Colorado River. The term "Granby Basin" is used by experts to describe the late Tertiary structural basin in the vicinity of the town of Granby. The faults are well defined by topographic, vegetation, and tonal lineaments and it has been concluded that fault activity occurred prior to middle to early Pleistocene time.

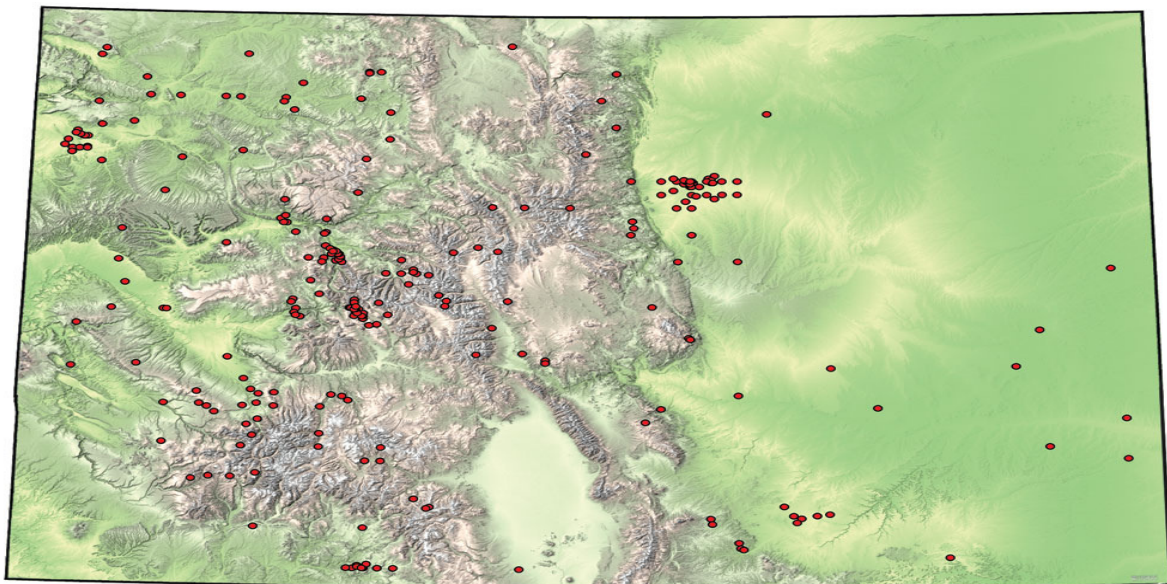
One suspected fault structure is known as "Granby Faults West-unnamed". This north-south-striking unnamed fault lies west of the town of Granby on the western margin of the late Cenozoic Granby Basin and extends from Trail Creek southward to east of Cottonwood Pass. Several other faults in this basin have documented movement.

Another fault structure lacks a name, but lies in the Gore Range west of Kremmling. Recent data suggests this fault has had major movement on the east flank, and minor movement on its west flank.

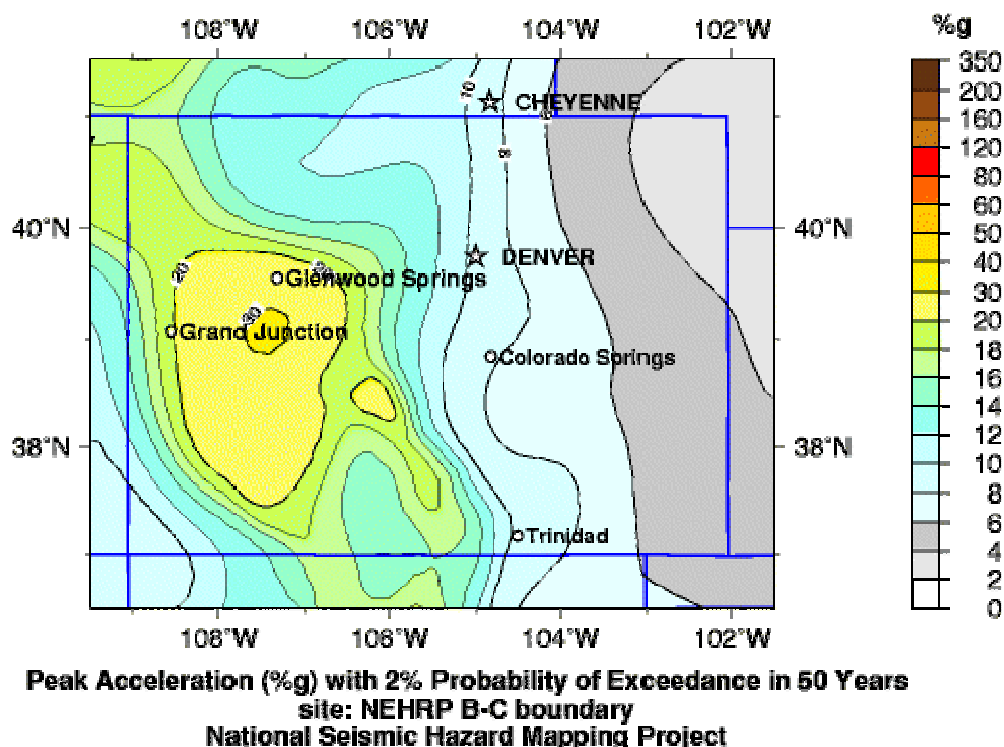
The Parshall fault trends northwest on its west end, and east-west on its east end. It extends southeastward from the East Fork of Troublesome Creek north of State Highway 40 to Blue Ridge near the town of Parshall. The fault lies in Middle Park.

It is difficult to accurately forecast the timing or location of future damaging earthquake activity. Over the years, seismic activity has been detected as close to Grand County as Pitkin and Eagle Counties. No significant events have been recorded to date in Grand County, however, and it is largely for that reason that this potentially destructive hazard is considered by county residents and experts as a minor threat. But since the County is growing and is located over several faults, the occurrence of movement could cause significant damage.

Earthquakes in Colorado, 1867-1996



Seismic Hazard Map of Colorado



VOLCANIC ERUPTION

More than 75 percent of the Earth's surface above and below sea level, including the seafloors and some mountains, originated from volcanic eruption. Emissions from these volcanoes formed the Earth's oceans and atmosphere. Volcanoes can cause tsunamis, earthquakes, and dangerous flooding.

A volcano is a vent in the Earth's crust that emits molten rock and steam. Volcanoes are relatively site specific, but the molten rock, steam, and other gases they release can affect much larger areas.

Lateral blasts are volcanic explosions that are directed sideways and can propel large pieces of rock at very high speeds for several miles. These explosions can kill by impact, burial, or heat and may have enough force to knock down entire forests. The majority of deaths attributed to the Mount St. Helens volcano were a result of lateral blast and tree blow-down.

There are more than 500 active volcanoes in the world, more than half of which are part of the "Ring of Fire," a region that encircles the Pacific Ocean. More than 50 volcanoes in the United States have erupted one or more times in the past 200 years. The most volcanically active regions of the nation are in Alaska, Hawaii, California, Oregon, and Washington. While the danger area around a volcano typically covers approximately a 20-mile radius, some danger might exist up to 100 miles away. Although hot springs exist in and around Grand County, Colorado is not deemed to be in direct danger from the effects of any of today's active volcanoes.

This is not to say that Colorado is completely free from this natural hazard. The Dotsero volcano, or Dotsero crater as it is sometimes known, is described as a pile of ash and reddened soil located on the east end of Glenwood Canyon near the town of Dotsero. Approximately four thousand years ago, however, the volcano erupted and left a lasting imprint on the surrounding area. Dotsero is considered a "maar," or explosive volcano, and

it produced "lahars," which are mudflows of water and volcanic ash that traveled about one and a half miles downstream of the volcano and caused the flow of the Grand River to be diverted to the south side of the valley. Such mudflows can be quite damaging as was seen when the 1980 eruption of Mount St. Helens caused flows that dammed a river and extensively damaged buildings in the vicinity. Volcanic flow from the Dotsero crater is visible on the south side of I-70 and the crater itself is north of the interstate, above a trailer park.

The US Geological Survey (USGS) recently evaluated volcanic activity potential across the country for the first time in many years, and rated Dotsero as a moderate threat for its potential to hurl volcanic ash into the skies at such an altitude as to create a threat to airplanes flying through the heavily trafficked area.

While the threat of such an eruption of Dotsero is not deemed imminent, perhaps not even a concern for several generations, the USGS reports that any volcano which has been active in the last 10,000 years could become active again. Even if Dotsero becomes active at some point in the future, it does not pose a real risk to Grand County.



Dotsero Volcano, near the junctions of the Colorado and Grand rivers

ASTEROID/COMET IMPACT

The brilliant, clear night skies of Grand County bring great pleasure to all who view them. The absence of light pollution encountered in other less-pristine locations and elsewhere along the Colorado Front Range makes the viewing of meteors a commonplace occurrence.

Despite the joy experienced when observing a meteor flash, hazards are posed by objects entering earth's atmosphere. For example, the recent discovery of a new, "near-Earth object", known as "2004 MN₄" caused astronomers to refine their initial calculations from one chance in 170, to one in 38 that a 1,000 foot wide stone object, acting much like a missile, will hit the earth as soon as April, 2029.

Subsequent calculations revealed that the asteroid should bypass the earth, but only by between 15,000 to 25,000 miles. This celestial close encounter highlights the notion that such an event is perhaps more inevitable than some have previously thought. Asteroid 2004 MN₄ is considered by experts to be a "regional" hazard, one that is big enough to flatten an area the size of Texas or some European countries with an impact equivalent to 10,000 megatons of dynamite, more than all the nuclear weapons in the world. Some scientists state that even if the asteroid misses the earth in 2029, its gravitational effects on the Earth may be such that it develops an "orbit match up" with our planet that brings it close again in the years 2034 through 2038, and even later.

An impact by a near-Earth object (NEO) greater than 1 km diameter could have serious global environmental consequences and societal ramifications, and a 3 km asteroid could threaten the future of human civilization. Because of uncertainties, unprecedented global consequences could conceivably result from a smaller impact. Beyond that, impacts by much smaller asteroids, say 100 - 200 meters in size, are much more likely to happen and could cause a regional catastrophe of a magnitude that society is not prepared to deal with. NEOs of less than 30 meters diameter cannot cause significant damage on the ground, although psychological reactions to an unexpected blast in the upper atmosphere to the equivalent of 1 megaton of TNT could have adverse consequences.

Despite the discovery of 2004 MN₄ and the emerging evidence of the future likelihood of a cataclysmic impact with Earth, there are no credible forecasts of immediate impact to the planning area. Furthermore, no known mitigation strategies exist today that Grand County could undertake on its own. Although this viewpoint involves a certain measure of fatalism, it is for that very reason that asteroids and comets are considered a hazard beyond the scope of consideration for this planning effort.

HUMAN-CAUSED HAZARDS

FEMA considers "manmade" hazards (referred to in this document as "human-caused") to be technological hazards and terrorism. These are different from the natural hazards considered above because they arise from human activity. In contrast, while the risks presented by natural hazards may be increased or decreased as a result of human activity, they are not inherently or intentionally created by humans.

The term "technological hazards" refers to the origins of incidents that can arise from human activities such as the manufacture, transportation, storage, and use of hazardous materials. To distinguish from intentionally-caused or terrorist events, this definition assumes that technological emergencies are accidental and their consequences unintended. The term "terrorism" refers to *intentional*, criminal, malicious acts designed to further a political or social agenda.

Human-caused hazards reviewed for this plan run the gamut and include such concerns as potentially catastrophic Weapons of Mass Destruction events, widespread flooding caused unintentionally, hazardous materials spills, and prison breaks. Public and professional participants in this project did not rank terrorism events as very likely and ranked HAZMAT and human-caused flooding events as having a greater probability of occurrence. Despite terrorism's lower rating, Grand County offers well-known, high profile events and venues, and the possibility of them being the site of a terrorist event has not been overlooked.

TERRORISM – INTERNATIONAL AND DOMESTIC

Terrorism is defined in the Code of Federal Regulations as "the unlawful use of force and violence against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political or social objectives." When terrorism strikes, victim communities may receive assistance from State and Federal agencies operating in concert with the existing National Incident Management System (NIMS). FEMA is the lead Federal agency for supporting State and local response to the consequences of terrorist attacks.

Terrorism is often categorized as "international" or "domestic", and this distinction refers *not* to where the terrorist act takes place but rather to the origin of the individuals or groups responsible. For example, the 1995 bombing of the Murrah Federal Building in

Oklahoma City was an act of domestic terrorism, whereas the attacks of September 2001, notwithstanding that the sites struck were within the United States, were international in nature because of the origins of the perpetrators. For the purposes of consequence management, the origin of the terrorist is less important than the results of the attack on life and property. Thus, the distinction between domestic and international terrorism is not as relevant for the purposes of mitigation, preparedness, response, and recovery than understanding the destruction such groups can cause.

Right-wing militia groups in the United States have been thought to be in decline for years, perhaps as a result of the spotlight being placed upon them after the April, 1995 Oklahoma City bombings. The Anti-Defamation League (ADL) tracks such extremists, however, and reports that they have experienced a recent growth in activity that indicates a renewed, but low key, attempt to revive the anti-government movement. These new groups operate more quietly and train more intensely than their 1990s counterparts, and have post-September 11 versions of the "New World Order" conspiracy theories that motivated their predecessors.

Although the militia movement has been around for many years, it burst into greater prominence in the wake of deadly standoffs at Ruby Ridge, Idaho, in 1992 and Waco, Texas, in 1993. It garnered great publicity following the Oklahoma City bombing in 1995, although it was erroneously linked to that horrific event. At its peak, the movement had hundreds of groups and thousands of members. In its current monitoring of the militia movement, the ADL lists 30 states which have active militia groups. Colorado is not one of those states considered as having an active group, although it is hard to imagine that this is so given our state's history and vast rural nature that has proven so attractive to such groups.

One recent possible example of militia activity occurred in November, 2005 when the FBI arrested a Denver firefighter for weapons offenses. Information developed through an undercover operation led to reports that the suspect may have harbored strong anti-government sympathies, but he was subsequently convicted on a single charge of selling an illegal machine gun. No information was available about the militia ties, if any, he may have had.

Also recently, Nicholas Vovos, 24, of California, was sentenced to 38 years in state prison in Colorado, on October 4, 2006. Vovos was convicted in July of attempted murder and assault on peace officers, stemming from a shootout with police in Colorado on July 3, 2005, in which his wife was killed. Vovos also faces murder charges in California, where prosecutors may seek the death penalty. During the sentencing hearing, Vovos' hair was cut short so that the "Muscoy Boy" tattoo on the back of his head was clearly visible. According to authorities, the tattoo refers to a town in California where Vovos was a member of a skinhead group.

While the list of confirmed terrorism-related events in Colorado is not long, it is perhaps highlighted by the notorious act of domestic terrorism committed by the eco-terrorist group, the Earth Liberation Front (ELF) at the Vail Ski Resort in October, 1998. Three buildings and portions of four chair lifts were destroyed by fire and damages with a value of approximately \$12 million were incurred. In a letter sent to news-media outlets, ELF claimed responsibility for the arson "...to stop the destruction of natural habitat and the exploitation of the environment." It stated the Vail expansion plans would "...ruin the last, best lynx habitat in the state. Putting profits ahead of Colorado's wildlife will not be tolerated. This action is just a warning. We will be back if this greedy corporation continues to trespass into wild and unroaded areas."

Fortunately, the ominous threat advanced in the letter remains unfulfilled more than seven years later, and those allegedly responsible for the fires were indicted federally in December, 2005. Despite the indictments, additional associates undoubtedly remain to take up their cause, and they too have demonstrated their willingness and ability to strike at economic interests that do not measure up to their rigid notions of acceptable growth.



Vail, 1998 Ecoterrorism and its aftermath

While Grand County is not a likely target of international terrorists who try to create sensational and deadly events where possible, the quality of living and desirable lifestyle offered by its communities make the county a highly attractive area to live or retire for many of today's "baby boomer" generation, among others. As a result of its desirability, rural qualities, high profile, and patterns of growth, Grand County will remain an attractive target in the coming years to fringe elements such as eco-terrorists.

AIRPLANE CRASHES

Periodic plane crashes are an unfortunate fact of life in mountain regions. Unpredictable, sometimes violent weather and rugged terrain often create a hazard for air travelers, especially those traveling in smaller craft. Grand County's recent history reflects a number of aviation incidents, some fatal, and many of which are concentrated around the county's airport.

Grand County, like many mountainous areas, demands the best of pilots. Grand County has two primary airports, Grand County/Granby airport, which is located in open terrain atop the Granby Mesa, offers an easily accessible mountain airfield. Further to the west, McElroy Field, located in Kremmling, features a 5,100' runway that can handle large private jet aircraft.

According to Federal Aviation Administration records, Grand County Region/Granby Airport has been the scene of seven accidents in the 19 years between December, 1983 and December, 2002. Two of these accidents resulted in fatalities. McElroy Field too has had some experience with aviation accidents, as described below:

Historical Event 1:

On March 19, 2003, at 7:30pm MST, a Beech E-90, N711TZ, piloted by an airline transport pilot, was substantially damaged when the airplane impacted mountainous terrain and subsequently nosed over, approximately 1-1/2 miles southeast of McElroy Field in Kremmling. The cross-country flight originated at Grand Junction, Colorado, and was en

route to the Steamboat Springs Airport when it was diverted to Kremmling to pick up a snowboarder injured at the Winter Park Ski Area. The pilot, a paramedic, and a flight nurse on board all reported sustaining minor injuries in the accident.

The pilot set up for a landing at 8,400 feet mean sea level, putting him at what would have been 1,000 feet above the airport elevation of 7,411 feet. The pilot reported it was very dark and he could see the airport, but could not see the terrain. He suddenly saw the ground and the airplane impacted the terrain and came to rest. Had the impact occurred about 20 feet lower, the plane would have rammed into the side of the mountain. The pilot reported that the airplane was experiencing no malfunctions prior to the accident. Flight control continuity was confirmed and an examination of the engines, engines' controls, and other airplane systems revealed no anomalies.

About six to eight members of Grand County Search and Rescue responded to the crash site on snowmobiles, and it took about 30 minutes to reach the passengers. Weather did not hamper the rescue, and the rescuers completed their mission in about two hours.

Historical Event 2:

On February 13, 2004, a Bell, 47G-3B-1, N83702 was substantially damaged during a hard landing at McElroy Airfield in Kremmling. The commercial pilot, the sole occupant on board, was not injured. Visual meteorological conditions prevailed. No flight plan had been filed for the local flight.

According to the pilot, he was practicing "power-on recovery, autorotations" from an altitude of 800 feet. He said he had completed two autorotations and was attempting a third autorotation when it appeared that the aircraft was losing power. The pilot attempted to recover to a hover. However, he had insufficient power to do so, which resulted in a hard landing. During the impact, the vertical stabilizer and both tail rotor blades were bent and the tail rotor short-shaft separated from the long shaft. An examination of the helicopter's systems revealed no anomalies.

Historical Event 3:

On April 7, 2005, a Piper PA-22-135, N3766A, piloted by a private pilot, was destroyed when it impacted mountainous terrain, approximately 4.5 miles southwest of McElroy Field. Visual meteorological conditions prevailed at the time of the accident. The private pilot, whose body was not recovered, was presumed to be fatally injured. The commercial pilot rated passenger was also fatally injured.

The airplane departed Kremmling at approximately 3 pm and was reported missing on the evening of April 7, 2005 by concerned family members. A search and rescue alert notice was issued on the night of April 7, but was subsequently cancelled and the search suspended on April 18. On August 5, 2005, two hikers discovered the airplane wreckage on the south wall of Gore Canyon at an approximate elevation of 7,960 feet.

Historical Event 4:

On July 30, 2006, a single-engine plane crashed into the mountains east of Winter Park, killing two people. The victims were the only people on board. The plane had taken off from Kremmling Airfield and was on its way to Boulder. The plane went down in the Indian Peaks Wilderness Area near the Skyscraper Reservoir, near the



line between Boulder and Grand counties. The location is well known to pilots who cross the Continental Divide and has been the site of several fatal plane crashes.

Historical Event 5:

On August 15, 2006, a pilot and his 3-year-old son survived a plane crash and then a night at the crash site. Their small plane went down about 8 miles west of Kremmling when the pilot missed the runway at McElroy Airfield, then clipped some trees with his landing gear while attempting to turn around. The plane skidded into a field on a private ranch, where rescuers found it the next morning. Fortunately, the pilot suffered only relatively minor injuries, and his young son was uninjured. Search efforts were hampered by the signals from the plane's emergency-locator transmitter that bounced off a surrounding hill and gave false readings



about the exact location of the downed aircraft.

JAIL/PRISON ESCAPE

The problems and crimes associated with rapid growth in Grand County over the past few decades have, not surprisingly, created some demand for increased law enforcement services.

Grand County does not have a Department of Corrections facility located within its boundaries. The nearest one, the Rifle Correctional Center (RCC), a Level I minimum security facility, is located in Garfield County. This facility should house prisoners only of the lowest classification, or security risk, levels and has a maximum bed capacity of 192. During the four calendar years from 2000-2003, the RCC reported one inmate escape in 2001.

Grand County itself has a county jail located in Hot Sulphur Springs, the county seat. The jail was built in 1983 and was designed to hold 38 prisoners, who are generally those serving sentences or awaiting sentencing and who cannot afford to post a bond for their release. Due to the growth in the county over the past decade, a remodeling effort is planned for 2007 if the budget allows. A dormitory room will be created from the current recreation room area, and this will provide 8 additional beds.

A major expansion of the existing facility is possible in the future, but is most likely limited to a vertical addition because of the construction of a new courthouse on the grounds nearby.

The sheriff of Grand County has expressed his opinion on the topic of illegal immigration and its impact countywide. A new state law requires all law-enforcement officers to report to the Bureau of Immigration and Customs Enforcement (BICE) any suspected illegal immigrant who is arrested. Sheriff Rod Johnson said the new law will generate more work with little impact. "We're going to waste a lot of time for nothing, because it's not a matter of whether we can pick more up and identify more. The choke in this whole thing is deportation." The overall Grand County jail population ranges from 30 to 45 inmates at any given time, and 3-5 are suspected illegal aliens who cannot be released due to legal "holds" placed on them by BICE for purposes of deportation. Compared to some other Colorado counties, the sheriff does not believe illegal aliens are an unusually high

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percentage of the inmate population, but it does add to increased pressure within that group when the inmate turnover rate is slowed by such indefinite holds.

The sheriff's office reported a total of 51 employees in the year 2004.

Employee Total Numbers	46
Number of Officers	21
Number of Civilians	25

Grand County sheriff's office and crime-related statistics as provided by the Colorado Bureau of Investigation are provided below for 2005:

Reported Offenses

Number Months Reported	12
Murder/Manslaughter	0
Negligent Manslaughter	0
Forcible Rape	0
By Force	0
Attempted	0
Robbery	0
By Firearm	0
Knife/Cutting Instrument	0
Other Dangerous Weapon	0
Strong Arm	0
Assaults	55
Firearm	0
Knife/Cutting Instrument	2
Other Dangerous Weapon	0
Hands/Fist/Feet	39
Other Assaults	14
Burglary	54
Forced Entry	5
Unlawful Entry	47
Attempted	2
Larceny/Theft	204
Motor Vehicle Theft	7
Auto	6
Truck	0
Other	1
Arson	0
Total Number of Offenses	320

Reported Arrests

Crime Category	Adult	Juvenile
Murder Non Negligent Manslaughter	0	0
Manslaughter By Negligence	0	0
Forcible Rape	0	0
Robbery	0	0
Aggravated Assault	2	0
Burglary	4	1
Larceny	16	7
Motor Vehicle Theft	1	1
Other Assaults	15	1
Arson	0	0
Forgery	0	10
Fraud	0	0
Embezzlement	0	0
Stolen Property	0	0
Vandalism	0	0
Weapons	0	0
Prostitution	0	0
Other Sex Offenses	1	0
Drug Violations	21	0
Gambling	0	0
Other Family Offenses	24	0
DUI	52	2
Liquor Law Violations	49	6
Drunkenness	2	0
Disorderly Conduct	5	0
Vagrancy	0	
All Other Offenses	114	9
Curfew Violations		0
Runaways		0
Total Number of Arrests	306	37

Three hundred forty-three adults and forty-three juveniles were arrested in Grand County in 2004.

The sheriff does not consider jail breaks or escape to be a major concern. He noted that only once did an inmate "escape" from the grand County jail, and that occurred about 8 or 9 years ago when a trustee of the jail simply walked away while he was working outside. The sheriff's larger concern is that he has nowhere to house his inmates in case Grand County jail becomes uninhabitable for a period of time due to a natural disaster or manmade event.

CIVIL DISTURBANCE

Potential losses and damages associated with civil disturbances have typically been associated with looting, rioting, destruction of property, vandalism, and infliction of injuries. Historically, most major episodes of civil disturbance that have resulted in death, injury, or the destruction of property have occurred in large cities with major socioeconomic problems and social justice issues. College campuses and surrounding areas are sometimes the focal point of protests or bad behavior, such as that associated with parties or sporting events. In Colorado, the periodic riots on the "hill" in Boulder come to mind, or the seemingly annual protests associated with Columbus Day or Martin Luther King Day marches in Denver are others. Annual or occasional events such as music festivals or rock concerts attended by large gatherings of young people create a venue for spontaneous civil disturbances, but available data does not accurately predict such occurrences in Grand County. Law enforcement and civil authorities must rely on experience, observation, and human intelligence sources to glean relevant information in advance of the incident.

Local officials may acquire information regarding issues of concern in the county that could result in future protests or uprisings. The prominence of a growing resort town like Winter Park creates a potential target for attention-seeking protesters, and Grand County has residents and high-profile visitors who might be targets of protest for a variety of reasons. But social and political activists and extremists in most environmental and animal rights movements, as an example, frequently operate under the cloak of anonymity rather than in traditional public venues. Such individuals or groups probably pose a greater threat as domestic terrorists or arsonists than as catalysts for civil disturbance.

Grand County's sheriff understands this issue and believes that civil disturbances may be an isolated risk faced by his office. However, it is not a sufficient priority for the planning team to remediate. Generally mass events, such as the concerts noted above, require security, and promoters of such events often hire off-duty sheriff's officers or local policemen to provide such protection. Since the promoters draw from the existing ranks of law enforcement personnel, this practice does not add additional numbers of security forces to those already available through the sheriff's office and local departments. The sheriff recognizes that he could face a sudden need for additional law enforcement personnel in the event of a civil disturbance, but he believes resources from adjoining counties would be readily available to meet the demand.

FLOOD DUE TO HIGH FLOW EVENT BREACH BY INTENTIONAL OR INADVERTENT HUMAN INVOLVEMENT

Dams have proven to be attractive wartime targets, and they are considered by some to be potential targets for terrorists. The terrorist's desire may be hard to fulfill in this case though, because the deliberate destruction of a dam is no simple task. Yet the possibility exists that such an act could occur, and it should not be discounted by law enforcement, the community, or the dam owner. The county has nine Class I and nine Class II dams located within its borders. According to the state's Division of Emergency Management, all the Class I dams have emergency preparedness plans in place.

The range of human behavior encompasses simple mistakes, operational mismanagement, or unnecessary oversights, and these can be potential causes of dam failure. Such risks can act in combination with other hazards to aggravate the possibility of failure and should be included in the analysis of risk to a dam. For instance, various pieces of mechanical equipment, manhole covers, and rock riprap are especially susceptible to vandalism and damage. Dirt bikes and all-terrain vehicles, in particular, can severely degrade the vegetation on embankments, and worn areas lead to erosion and more serious problems. Some community experts have voiced concerns about the consequences of a major

landslide into a water reservoir, and this may be one of the most probable threats to consider for future mitigation activities.

Another activity that poses a risk is the tendency for people to create communities near or below dams. The construction of residences, buildings, and other structures in the potential flood zone creates new risks, and will most likely create increased risks in the future. Those risks are not confined to Grand County residents. As noted above in the "Flooding" section, the failure of Granby Dam would flood Interstate 70 and U.S. 6 & 24 from DeBeque to Palisade in Mesa County.

Notwithstanding these potential perils, the hazard of a human-caused high-flow event is considered low by the Grand County planning team.

MILITARY ACCIDENT

Military accidents of all kinds were another hazard considered by the planning team, but little evidence is available to indicate these kinds of incidents should receive priority treatment.

One incident that occurred in the nearby area and received nationwide attention happened in April, 1997 in Grand County, when an A10 Warthog, flown by Captain Craig Button and carrying four 500-pound bombs, veered off course from a training mission in Arizona and was tracked by radar and visual sightings to the vicinity of New York Mountain.

Residents near the flight path and crash site reported hearing loud explosions and seeing heavy smoke. The debris of Captain Button's plane was subsequently found on the side of a 12,500-foot peak about 15 miles southwest of Vail. At the time, rumors were rampant that Captain Button's plane may have been hijacked by terrorists or, perhaps, was willingly turned over to radicals. The onboard presence of bombs and the suspicious fact that the plane had veered as much as 800 miles off-course in southwestern Colorado only added to the concerns. After a lengthy investigation, the crash was officially ruled a suicide.

Events such as these are spectacular and command headlines for a time, but are rare in the planning area. The planning team accordingly ranked this category low on their list of area hazards.

ARSON

According to the United States Fire Administration statistics of 2003, Colorado is ranked the third lowest in fire-related deaths per million with a rate of 5.1, a slight reduction from the prior year. Only the states of Hawaii and Wyoming had lower fire-related death rates.

The FBI's Uniform Crime Reporting defines Arson as unlawfully and intentionally damaging or attempting to damage any real or personal property by fire or incendiary device. Notwithstanding the low fire-related death statistics cited above, other statistics, derived primarily from the 1990's, suggest that arson was a significant problem in Colorado, with a rate that at the time was the third highest in the country. In an "average" year, according to Uniform Crime Reports data, there will be 1,589 reported arson fires. These fires will destroy \$8.8 million in property, and less than 22 percent of these offenses will be solved. In 2002, property losses spiked to more than \$25 million, perhaps in part due to the dire fire situation the state found itself in that year. In all of Colorado in 2005, 497 arrests were made for arson, with 190 of those, or 38%, being against persons under the age of 18.

Arson is the single greatest cause of fires in records repositories throughout the United States. And because records centers represent government, they may be targets of

deliberate or random violence. In some cases, the arsonist is someone known to the center's staff.

According to figures from the Bureau of Alcohol Tobacco and Firearms (BATF), since 1982, there have been 169 arsons and/or bombings of abortion clinics. The FBI considers such incidents not as criminal acts, but rather acts of terrorism, and a task force comprised of BATF, the FBI, the U.S. Marshals Service, and the Department of Justice continues an ongoing investigation to determine if a national conspiracy or conspiracies exist.

Statistics compiled by the Colorado Bureau of Investigation (CBI) paint the following picture about arson events in the state in 2005:

Property Classification	Number of Offenses	Value of Property Loss
Single Family	161	\$1,776,501.00
Multi Family	61	\$484,513.00
Storage Facility	29	\$41,609.00
Industrial/Manufacturing	1	\$488.00
Commercial	35	\$371,194.00
Community or Public	65	\$51,798.00
All Other Structures	63	\$330,586.00
Motor Vehicles	227	\$637,636.00
Other Mobile Property	13	\$64,258.00
All Other Property	665	\$375,639.00
Total	1,365*	\$4,134,222.00

*The total includes 45 attempted arsons.

While arson is an issue of concern nationwide as well as in Colorado, the CBI reports no incidents of the crime in Grand County from 2003-2005. This does not mean that the planning team can ignore the issue, and a thorough state of preparedness by county emergency responders will be critical to minimizing loss of life and property during any significant fire event, including incidents of arson.

From a historical perspective, one event, termed the Gibson arson, from the early 1980's was recalled by some planning team members. Specific information about the incident was not located, however.

URBAN FIRE (ACCIDENTAL)

Another hazard profiled by Grand County was urban fires. Major structural fires sometimes have a severe impact on a community, especially smaller ones. In addition to inventory loss and damage, which can be complete, structural fires can cause serious injury and death, as well as place strain on public safety infrastructure such as fire departments, hospitals, power, and water supplies. A concern in some areas of Grand County is the availability of fire suppression equipment and infrastructure (e.g., fire hydrants and water sources) to rural populations.

Because the urban fire was not deemed a priority hazard for this planning effort, certain data categories, including the construction characteristics of structures in the area such as building materials used (e.g., wood vs. brick, fire detection equipment, age, etc.), proximity to forested areas, and availability of fire suppression infrastructure was not identified for this project. Based on available information, all structures in the study area are at some risk of being destroyed or seriously damaged by a fire. Buildings constructed of wood are generally more likely to burn down than buildings constructed with bricks or concrete.

Urban fires occur occasionally in the study area, and while the effects are localized, impact can sometimes be severe. As in many mountain and resort communities, problems that exacerbate the fire hazard include the fact that many homes and other structures in the area tend to be isolated from emergency services. Although damages to individual buildings and other structures can be great, and death and injury losses can ensue, the impacts to most critical facilities and utilities would likely be localized and of short duration.

There are 209 square miles within the East Grand Fire District boundaries. This area covers the Fraser Valley from the top of Berthoud pass to Red Dirt hill and from the Continental Divide to Byers Peak. The towns of Winter Park, Fraser, and Tabernash, Colorado, are in the district. In 2005, East Grand Fire responded to 166 incidents for a total of 1,791 man hours, engaged in 2,813 hours of training, and had approximately 1,500 hours of truck usage. East Grand provides mutual aid responses to surrounding districts and is staffed by 50 volunteers.

Other Grand County fire departments include Grand Fire Protection District (34 volunteers), Grand Lake Fire Department Protection (35 volunteers/5 career fire fighters), Hot Sulphur Springs - Parshall Fire Protection District (10 volunteers), and the Kremmling Fire Department (17 volunteers/1 career firefighter).

In 2003, Colorado fire departments responded to approximately 362,467 incidents of all types. Of these, approximately 14,786 were fires. These fires resulted in an estimated 22 civilian fire deaths, 150 civilian fire-related injuries, and \$72.4 million in estimated (direct) property loss. Additionally, approximately 66 firefighters were injured in the line-of-duty during the year.

Historical Event 1:

On June 18, 2006, a fire engulfed a house south of Grand Lake, and left two of its occupants dead. The fire was reported at about 1:30 a.m. near Lake Granby, and fire personnel from the Grand Lake Fire Department, emergency personnel, and sheriff's deputies responded. Two of the four occupants managed to escape, but a 54-year-old man and a 40-year-old woman died in the fire.

Historical Event 2:

In March, 2006, a strong explosion and fire occurred at the Lakota Lodge condominiums in Winter Park.



October 2005: Fire inside roof structure of a private residence. Probable cause is a chimney fire from a wood stove. Automatic aid comes from 29 firefighters from East Grand Fire and 7 Firefighters from Granby.



House fire Thanksgiving morning 2004

EXTREME ACTS OF VIOLENCE

Difficult to predict and hard to mitigate in advance, extreme or random acts of violence can severely impact a community and leave long-lasting effects. One national example was the havoc wreaked for weeks by the Washington, DC snipers in 2002. During a period in the fall of 2002, Lee Malvo, a 17 year old, and John Muhammad roamed the metropolitan Washington, DC area as snipers and randomly killed 10 people and wounded several others. The pair literally terrorized the region, while many in the press and public arena, as well as the local citizenry still suffering from the acute shocks of the 9/11 attacks, speculated that the snipers were part of a scheme carefully planned and executed by foreign terrorists.

Much closer to home, and also an event that drew national attention, Grand County itself experienced firsthand the reality of a seemingly random act of violence. On June 4, 2004, County resident Marvin Heemeyer, a local businessman, used his skills as a welder to equip and armor a 50-ton Komatsu D335A bulldozer in order to exact a personal vendetta on the town of Granby. During his siege, which lasted hours and caused the evacuation of many residents and the closure of town roads, Heemeyer fended off numerous attempts by law enforcement officials to end his act of rampage that reportedly had been triggered by an adverse zoning decision. In the hours before he took his life, the perpetrator destroyed or heavily damaged buildings that included Granby's town hall and library, a concrete batch plant, a bank, the town's newspaper offices, an electric cooperative building, a store, an excavating business, and a house owned by the town's former mayor. More than 200

rounds of ammunition were fired in vain by law enforcement at the man's armored vehicle. Fortunately, nobody was injured in the incident. The bulldozer used to carry out the rampage has since become known as Killdozer.

Heemeyer's act and the DC sniper case were clearly very serious incidents and had the potential to create even more damage and bodily injury. They are unpredictable, but symptomatic of manmade threats facing American society today. Emergency managers everywhere have to be prepared to ask, "What if it happens in my community?" and "How does one mitigate against acts as bizarre and well-planned as Heemeyer's that even a novelist might not conceive of them?"

HAZARDOUS MATERIALS – FIXED INSTALLATIONS

Fixed facilities include companies that store hazardous waste at their facility as well as all hazardous waste sites.

Fixed-facility hazardous materials events occur within or outside of buildings, but within the facility premises. Also included as fixed-facility events are situations such as offloading of transportation vehicles where an employee of the fixed-facility or transportation company drops a box, for example, or punctures a container with a forklift. These differ from hazardous materials transportation events such as releases which are discovered upon offloading at a fixed-facility, but which happened *during transportation* of the materials.

Other examples of fixed-facility events include, but are not limited to, HazMat problems that occur at industrial sites, farms, schools, private residences, hospitals, and others.

The Colorado Department of Public Health and Environment has maintained a record of its HazMat surveillance activities for more than a decade. Statistics available for the program known as the Colorado Hazardous Substances Emergency Events Surveillance indicate that between 1993– 2004, Colorado experienced a total of 3,433 HazMat events. The majority of those, 2,017 in total, occurred at fixed facilities. For each fixed-facility event, one or two types of area or equipment involved in the fixed facility where the event occurred could be selected. Of all 54 fixed-facility events that occurred in 2004, 52 (96.3%) reported one type of area and 2 (3.7%) reported a combination of two area types. When combining types of area, the main areas were classified as follows: 22 (39.3%) storage above ground, 9 (16.1%) ancillary process equipment, 6 (10.7%) material handling area, and 6 (10.7%) indoor, non-industrial living (residence) areas.

These same statistics indicate that Grand County reported one HazMat event in 2004 at a fixed-facility. No transportation events were reported during 2004. Between 1993 and 2004, a total of 4 incidents were reported in Grand County, two of which were transported events, including one that occurred within a quarter mile of a residential area. No injuries were reported.

The HazMat Fixed event occurred in the Town of Grand Lake during 2004 when an ammonia leak at the recreation center on two separate occasions resulted in the evacuation of the center and several surrounding homes.

The planning team also advised that a bromine leak in a private hot tub during the summer of 2004 sickened six people and required the transport of one child to an area clinic.

VEHICLE CRASHES (MULTI AND SINGLE)

The National Center for Health Statistics (NCHS), in its annual report on mortality, includes automobile crashes under the very general category of *Unintentional Injuries*. Fatalities due to motor vehicle traffic crashes comprise a significant proportion of all fatalities due to unintentional injuries, especially at younger ages.

While vehicle crashes are not considered a natural hazard, nature's contribution to the problem cannot be overlooked. A combination of typically severe Colorado mountain winter weather, topography, and wildlife habits has combined with the characteristics of the county's rural roads to cause crashes to be ranked as a hazard for the area.



According to the National Highway Transportation Safety Administration, Colorado suffered 665 of the nation's total of 42,636 traffic fatalities in 2004, a statewide rise of 4% from the 642 traffic fatalities reported in 2003. Grand County's traffic fatalities rose to a total of 5 in 2004 from only 3 a year earlier.

Other detailed statistics compiled about Grand County have been provided by the Colorado State Patrol (CSP). These provide an insight into the number of crashes on the roads patrolled by the CSP, which are the more heavily trafficked ones in the county.

NOTE: Statistics in this section are based on vehicle crashes within Grand County and investigated by the Colorado State Patrol.

Reported auto accidents for Grand County during calendar years 2001, 2002 and 2003:

Auto Crash Category	Total
Fatal Crashes	18
Injury Crashes	283
Crashes with Property Damage	960

Accidents, Grand County Roads (covered by CSP)	Highway 34	Highway 125	Highway 40	Highway 9	RWGRN (county roads west of Hot Sulphur Spgs)	REGRN (county roads east of Hot Sulphur Spgs)
2001	37	7	158	28	38	59
2002	56	16	213	38	33	72

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2003	38	7	190	23	41	69
2004	46	10	186	35	24	51
2005	31	3	210	29	28	69
2006	6	0	54	4	2	10

Four Causal Factors for Grand County vehicular crashes from January 1, 2001 through February 11, 2006:

Rank	Cause	No. of Crashes
# 1	Exceeding safe speed	627
# 2	Animal Caused	486
# 3	Inattentive driving	174
#4	Alcohol/Drugs	86

The following four major causal factors for vehicular crashes on specific Grand County highways and roads as reported by the CSP from January 1, 2001 through February 11, 2006:

	Casual Factors			
Location	#1 Exceeding Safe Speed	#2 Animal Caused	#3 Inattentive driving	#4 Alcohol/Drugs
Highway 40	310	273	85	45
Highway 34	25	106	24	7
Highway 125	13	11	5	4
Highway 9	35	67	7	4
RWGRN	73	19	16	16
REGRN	171	10	37	12
Totals	627	486	174	86

Within the CSP, each district commander selected the top two "most dangerous" stretches of state or federal highways in their territory based on the Historical number of fatal and injury crashes, as well as the causes of such crashes. These eleven targeted highway segments are also called "highway safety zones". The CSP did not include any of Grand County's roadways within its Highway Safety Zone program in 2005.

HAZARDS RISK BY JURISDICTION

Although these prioritized hazards affect all jurisdictions within the planning area, hazard risk and potential impact varies by jurisdiction. Impact from hazards for the jurisdictions participating in this plan is estimated in the Risk Assessment section.

Risk Assessment

Best practices and guidance from the DMA 2000 prescribes that multi-jurisdictional planning areas, such as conducted by Grand County, consider risk priorities and potential losses for the region as a whole. Risks related to each jurisdiction should also be assessed for vulnerabilities and loss potential specific for those jurisdictions. Grand County conformed to this guidance by conducting the following risk assessment activities to establish risk potential and hazard impact within the planning areas:

- Public Risk Assessment Input
- Identification of Critical Infrastructure
- Risk Assessment
- Risk of hazard impact by participating jurisdiction

Grand County used the risk assessment activities discussed in this section to identify hazards that pose high risks to Grand County. The planning team determined that these hazards justify mitigation planning and are, therefore, the focus of the mitigation actions described in this PDMP:

- Wildfires
- Winter Storms
- HAZMAT – transported
- Landslides/Rockslides
- Disease Outbreak

It is anticipated that future versions of the PDMP will not only refine the risk assessment for these hazards, but may encompass further analysis and planning for additional hazards not prioritized in this first plan.

PUBLIC RISK ASSESSMENT INPUT

Public comment was collected through hardcopy questionnaires and web-based surveys to increase the potential for public participation. As part of this survey process, the planning team also solicited input from professionals in emergency management, fire services, medical and health services, law enforcement, planning, education, airport management, government administration, community development, transportation, utilities, and others in public and private sectors.

The community surveys were conducted according to this general methodology:

- 1) Survey population was identified as:**
 - a. Community residents
 - b. Emergency responders
 - c. Certain government officials and administrative staff
 - d. Those with relevant subject matter expertise, such as those in planning, education, airport management, community development, veterinary services, utilities and the elements of the private sector
- 2) Survey notices were issued using:**
 - a. Newspaper advertisements
 - b. Public noticing in libraries and selected government offices
 - c. Individual invitations to groups such as fire departments, law enforcement and others

- d. Postings on Grand County' websites
- 3) Web-based and conventional survey mediums were used, including:
 - a. Forms with drop boxes at various public places such as library, government offices, community centers, churches.
 - b. Web-based surveys through the websites linked to each County home page
- 4) Survey questions were developed for general community members and those in emergency services
- 5) The surveys were conducted to allow ample time for response.
 - a. The survey launch was October, 2005
 - b. The survey concluded on November, 2005
- 6) Data collection and reporting
 - a. No personal data was acquired through this survey. Respondent names were requested on an volunteer basis only for survey validation
 - b. Survey results were compiled and analyzed by the planning team

The intent of the survey was to sample a broad set of stakeholders within the resources available. Although this survey was not conducted to scientific standards, the responses from community members were generally consistent with those from known experts and, therefore, considered valid input. The public survey results are summarized in an appendix to this Plan.

Grand County and their participating jurisdictions prioritized these hazards for mitigation planning:

Grand County and Participating Jurisdictions	
Hazard	Probability
Wildfire	High
Winter Storm	High
HAZMAT - Transported	High
Landslide/Rockslides	High
Disease Outbreak	Moderate

Grand County completed the risk assessments using processes most effective for their project teams. Grand County, under direction from its Emergency Management Coordinator, conducted multiple sessions where project participants reviewed, then completed, the qualitative risk assessment in workgroup settings.

HAZARD RISK BY JURISDICTION

The risk assessment activities conducted as part of this project provided the planning team with sufficient information and justification to describe hazard threats to the jurisdictions covered by this plan as shown in the table below. Grand County and participating jurisdictions elected to rank each hazard according to a risk scale defined by:

- Low – Hazard impact causes minor disruption to critical infrastructure and emergency services. Risks to life or safety are minor, and hazard impact causes little disruption to Grand County.
- Moderate – Hazard impact causes some disruption to critical infrastructure and emergency services, but the likelihood of such disruption directly contributing to personal injury, loss of life, or extensive property damage is not significant.
- High – Hazard impact results in disruption to critical infrastructure and emergency services and contributes to personal injury, fatalities, or extensive property damage.

This section does not predict the likelihood of a hazard incident, but rather describes expected impact from the hazard if such incident occurs.

Community	Wildfire	Winter Storms	HAZMAT Transported	Landslide/Rockslide	Disease Outbreak
Fraser	H	H	H	L	H
Granby	H	M	H	L	H
Grand Lake	H	H	H	L	H
Hot Sulphur Springs	H	M	H	L	H
Kremmling	M	H	H	L	H
Winter Park	H	H	H	L	H
Grand County - Unincorporated	M	M	H	M	H

The Planning team also considered the potential for the occurrence and future impact from the prioritized hazards. Expert input indicates that probability exists that the prioritized hazards will continue to affect the planning area. Based on population growth projections and anticipated property value increases, it was determined that the future impact potential from these hazards would increase in the absence of effective mitigation actions.

HAZARD IMPACT ON CRITICAL INFRASTRUCTURE

The planning team reviewed Grand County's critical infrastructure using the 13 critical infrastructure areas defined by the Department of Homeland Security. Impact from the prioritized hazards was ranked as *low*, *moderate*, or *high* for the identified critical infrastructures within Grand County. Findings from risk assessment activities were used to determine hazard impact on the critical infrastructure. Notwithstanding hazard impact on critical infrastructure, however, Grand County weighted mitigation actions for hazards affecting life and safety.

Due to the potentially sensitive nature of the critical infrastructure inventory, and in keeping with State of Colorado practices for controlling critical infrastructure identification, Grand County monitors access to this information through the Emergency Management Coordinators. This information is available on a need-to-know basis by application to the appropriate Emergency Management Coordinator identified in this Plan.

HAZARD VULNERABILITY BASED ON PROJECTED LAND USE AND DEMOGRAPHICS

Based on land use and population growth projections, Grand County anticipates continued rapid population growth over the next 20 years, particularly along the wildland-urban interface and adjacent to major transportation corridors. In the absence of effective mitigation measures, these projections indicate increasing loss potential from the prioritized hazards identified in this plan.

Demographic projections predict continued population growth of part time residents, including those inexperienced with the challenges posed by Grand County's environment

and natural hazards. Part time residents include a growing senior citizen population, which can be more at risk from these hazards and less capable of dealing with emergency response requirements. These at-risk populations will likely impose increased demands on Grand County's emergency services capabilities.

Hazard Mitigation

The risk assessment identified and prioritized these hazards for further mitigation planning:

- Wildfires

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- Winter Storms
- HAZMAT – transported
- Landslides/Rockslides
- Disease Outbreak

These hazards were prioritized, in part, by their broad impact (or potential for broad impact) on Grand County's residents, economy, critical infrastructure, and vital services. Also considered of nearly equal importance were natural hazards of lightning/thunderstorms and drought.

Grand County has adopted mitigation strategy guidance from FEMA that suggests a risk-analysis method that uses two general categories for pre-disaster mitigation:

- Actions to reduce the frequency and/or severity of hazard events
- Actions that reduce the vulnerability of community assets

Accordingly, the mitigation actions set forth in this section draw broadly on those concepts and from a collection of respected resources. For example, some of the proposed mitigation actions were suggested by survey and project participants from Grand County. Other potential actions were found during the course of research conducted for the project and are provided for additional analysis and consideration by county officials and interested citizens.

MITIGATION GOALS AND OBJECTIVES

To serve as a blueprint for Grand County's PDMP and to comply with FEMA guidance from the Hazard Mitigation Grant Program Final Rule, Grand County identified goals and objectives for mitigation actions. These goals and objectives provide metrics to gauge results of mitigation actions and to guide PDMP updates and improvements.

A mitigation goal is a broad guideline that explains what is to be achieved, and it serves as the vision for mitigation actions. Objectives, on the other hand, are specific steps or measurable actions needed to achieve the goals. The planning team considered and developed goals and objectives as part of the mitigation actions, and those goals and objectives are summarized with related proposed mitigation actions below. Goals and associated objectives and mitigation actions are listed in Appendix A of this document.

EXISTING HAZARD MITIGATION REPORTS, STUDIES AND PROGRAMS

Grand County has plans in place, studies either completed or in process, and programs underway that identify, assess, or mitigate the hazards identified above and others impacting the planning area. These existing actions are summarized in the following tables.

Grand County Existing Hazard Mitigation Reports, Studies and Programs			
Jurisdiction and Lead Agency	Mitigation Action	Mitigation Category	Relevant Hazard(s)
Grand County Division of Natural Resources	Grand County Community Wildfire Protection Plan (CWPP)	Property Protection	Wildfire
Grand County Community Development	Land Use and Zoning	Property Protection	All hazards
Colorado Division of Emergency Management	Colorado Hazard Mitigation Plan, 2004	Various	All hazards
Grand County Community	Geologic Hazard	Property	Rockslide /

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Development	Regulations	Protection	Landslide, Avalanche
Grand County Community Development	Drainage Standards	Property Protection	Flooding
Grand County Community Development	Commercial and Industrial Standards	Property Protection	HAZMAT-Transported
Colorado Div. of Emergency Management	Colorado Hazard Mitigation Plan, 2004	Various	All hazards
Colorado Division of Emergency Management	Northwest Region – All Hazards Response Plan	Various	All hazards

The planning team recognizes the benefit of incorporating, as appropriate, mitigation actions resulting from the PDMP with current and future hazard mitigation reports, studies, programs (including capital improvement plans), building codes reviews, hazard site reviews, and permitting. The Mitigation Update Committee, a subcommittee of the Grand County Local Emergency Planning Committee (discussed in the Plan Update and Maintenance section of this document), will work with the participating jurisdictions to facilitate that coordination.

PROPOSED MITIGATION ACTIONS

Grand County evaluated a broad set of mitigation actions for the prioritized hazards. Mitigation actions for these hazards were categorized into six groups:

- Prevention
- Property protection
- Public education and awareness
- Natural resource protection
- Emergency services
- Structural projects

Potential mitigation actions were determined through interviews with public and private sector experts, summarized in the table below, supported by input from community residents and independent research by the planning team. The table below includes a partial but representative list of sources consulted for potential mitigation actions relevant to the prioritized hazards.

Potential Mitigation Action Sources for Various Hazards	
Prioritized Hazard	Interviews and Document Reviews Conducted for Potential Mitigation Actions
Wildfire	<ul style="list-style-type: none"> • Chiefs, Local Volunteer Fire Districts • Division of Natural Resources personnel • Wildfire Mitigation Specialist, Grand County • Grand County District Forester, State Forest Service • Grand County wildfire regulations • Community Wildfire Protection Plan, Grand County
Winter Storm	<ul style="list-style-type: none"> • National Oceanic and Atmospheric Administration (NOAA) • Superintendent, Road and Bridge, Grand County • Emergency Manager, Grand County • National Weather Service

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	<ul style="list-style-type: none">• Operations Director, American Red Cross, Mile High Chapter• Service Center Coordinator, American Red Cross, Mile High Chapter, Egon Gerson Service Center
Avalanche	<ul style="list-style-type: none">• Director, Grand County Search & Rescue• EMS Captain, Grand County Mountain Medical Response Team, Grand County EMS• Sheriff, Grand County
Landslides/Rockslides	<ul style="list-style-type: none">• Superintendent, Grand County Road & Bridge• Colorado Geological Survey• Grand County Supervisor, Colorado Dept. of Transportation
HAZMAT - Transported	<ul style="list-style-type: none">• Chiefs, Local Volunteer Fire Districts• Colorado Department. of Transportation• Colorado State Patrol
Domestic and International Terrorism	<ul style="list-style-type: none">• John Mencer, FBI (Retired)
Disease Outbreak	<ul style="list-style-type: none">• Director, Grand County Public Health Nursing Department
Jail/Prison Escape	<ul style="list-style-type: none">• Sheriff, Grand County
Civil Disturbance	<ul style="list-style-type: none">• Sheriff, Grand County• Chiefs, Local Police Departments

Once collected, mitigation actions were evaluated using the STAPLEE methodology, which is a standard methodology approved by FEMA that seeks to objectively evaluate mitigation options and ensure those selected are consistent with, and complementary to, other community goals and objectives. The results of the STAPLEE evaluation process produced prioritized mitigation actions for implementation within the planning area. A summary of STAPLEE evaluation criteria is shown in the following table.

STAPLEE Mitigation Action Evaluation Criteria Overview	
S - Social	Actions are acceptable to the community if they do not adversely affect a particular segment of the population, do not cause unreasonable impact to lower income people, and if they are compatible with the community's social and cultural values.
T - Technical	Actions are technically most effective if they provide long-term reduction of losses and have minimal secondary adverse impacts.
A - Administrative	Proposed actions can have the necessary staffing and funding.
P - Political	Public support for the action is evident and all stakeholders have had an adequate opportunity to participate in the process.
L - Legal	The jurisdiction or agency implementing the action has the legal authority to do so.
E - Economic	An evaluation of whether or not the proposed action is cost-effective, as determined by a cost-benefit review and able to be funded.
E - Environmental	Verification that the proposed actions do not have an adverse environmental effect, comply with existing environmental laws and are consistent with the jurisdiction's environmental goals.

An example of the STAPLEE analysis tool used by the planning team is shown in Appendix C. The planning team considered the risk analysis, input from all project stakeholders, and results of the STAPLEE evaluation to identify the hazard mitigation goals, objectives, and specific actions to be undertaken by each County and their participating jurisdictions. These goals, objectives, and mitigation actions are listed in appendices to this Plan covering the jurisdictions as shown in the following table:

Jurisdictions
Grand County, unincorporated
Town of Fraser
Town of Granby
Town of Grand Lake
Town of Hot Sulphur Springs
Town of Kremmling
Town of Parshall
Town of Tabernash

MITIGATION ACTION IMPLEMENTATION STRATEGY

The mitigation actions identified in Appendix A will be implemented under guidance from mitigation work groups for Grand County and its respective participating jurisdictions. These work groups will be formed under direction of the emergency management coordinator and will include public participants from the planning area as well as others representing jurisdictional agencies such as finance, facilities, parks and recreation, fire, law enforcement, planning, and others.

Budget availability for hazard mitigation is minimal within Grand County. Recent changes to federal law, however, encourage a more proactive strategy, and Grand County's mitigation work groups will form the implementation plans to build on the work accomplished in this PDMP and meet that strategy.

The planning team has conducted a high level cost/benefit analysis on the mitigation actions listed in Appendix A of this Plan. These mitigation actions have been prioritized (high, medium or low) according to this initial analysis as reflected in that appendix. Further review, analysis and implementation planning will occur following adoption of this plan.

Grand County's mitigation action implementation plans will be formed by the mitigation work groups. Initial activities for these work groups will be to assess each proposed mitigation action in Appendix A and complete an implementation plan to include information, some of which is summarized in the following table.

Mitigation Implementation Planning
Prioritized Mitigation Action
Jurisdiction(s) covered by the Mitigation Action
Mitigation Category (prevention, structural, etc.)
Relevant Hazard(s) addressed by the action
Priority (High, Medium, Low)
Estimated Cost for implementation of the mitigation action
Potential Funding Sources
Cost / Benefit Analysis Results
Lead or Responsible Department
Implementation Schedule
Implementation Status
Environmental review for required studies and approvals

Plan Maintenance and Adoption

PLAN MAINTENANCE

The Plan is intended to be a 'living' document that informs stakeholders about hazard mitigation projects and plans undertaken by Grand County and their participating jurisdictions. Grand County understands the need to regularly review and update the PDMP based on evolving hazards, new mitigation techniques, and changes in land use and critical infrastructure within the planning area. This review and update occurs on a schedule that, at a minimum, meets provisions, rules, and laws covering hazard mitigation planning. This section provides a general overview of Grand County's PDMP maintenance process.

Mitigation Update Committee

Grand County has designated the following participants of the Mitigation Update Committee (the Committee). These individuals will guide plan maintenance and update activities, ensure that information in the Plan is current, and disseminate information to stakeholders within their respective jurisdiction.

Grand County		
Jurisdiction	Hazard Mitigation Update Committee Point-of-Contact	Review Schedule
Grand County	Emergency Manager	Annually
Town of Fraser	Town Manager	Annually
Town of Granby	Town Manager	Annually
Town of Grand Lake	Town Manager	Annually
Town of Kremmling	Town Manager	Annually
Town of Parshall	Mayor	Annually
Town of Tabernash	Grand County Emergency Manager	Annually
Town of Winter Park	Town Manager	Annually

Public Participation in Plan Maintenance

Although Committee members represent the participating jurisdictions and have point-of-contact responsibility for PDMP maintenance, Grand County also understands the importance of direct public input to the plan update effort. To facilitate public involvement of the plan maintenance process, the Committee will establish guidelines, some of which may include:

- Copies of the plan will be made available at certain public libraries and at other public buildings within Grand County.
- Announcements regarding the location and availability of the plans will be periodically made in local newspapers, at safety council meetings, and in other ways deemed appropriate by the hazard mitigation update committees.

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- Copies of the plan and proposed updates will be posted to the county's website along with instructions for public participation in contributing to the maintenance process.
- Public meetings will be held prior to adoption of plan updates where citizen comments will be collected, their concerns discussed, and ideas shared.
- The Committee will incorporate public ideas and comments into the plan maintenance process and adjust the plan as appropriate.

Annual Plan Review

The Plan will be reviewed by the Committee annually or when:

- Determined appropriate by the Update Committee
- Significant changes occur within the planning area involving threat impact or potential impact
- Changes occur to mitigation actions that are part of the Plan

As part of the annual Plan review, the Mitigation Update Committee will follow a process that:

- Requests input from project stakeholders not represented on the Update Committee, including members of the public. This input will include information on projects and programs important to mitigation planning.
- Makes minor adjustments to the plan to keep mitigation actions in line with approved goals and objectives
- Allows for a formal approval process for major changes to the Plan
- Makes changes, as appropriate, to the Mitigation Update Committee

Plan Review Criteria

The Planning team has defined initial criteria for evaluating the Plan, and these criteria will be modified and approved by the Mitigation Update Committee as appropriate. When evaluating the Plan, the Committee will, among other things, assess whether:

- Mitigation goals and objectives address current and expected conditions
- The nature and magnitude of threats have changed
- Current resources are appropriate for implementing the Plan
- The mitigation actions underway continue to be compatible with STAPLEE criteria and any other criteria determined relevant by the Update Committee
- The maintenance process includes a cross-functional set of participants, including members of the public and representatives of the jurisdictions involved in the Plan
- Mitigation actions encounter problems in implementation
- Mitigation actions are achieving outcomes as planned
- Mitigation actions are coordinated with other planning studies, reports, and programs in effect in Grand County and participating jurisdictions.

Grand County's Hazard Mitigation Update committee will meet periodically to, among other things, ensure that mitigation actions are incorporated into on-going planning activities. For instance, certain mitigation actions affect Grand County's land use policies, zoning

ordinances, capital improvement plans, wildfire plans, and river plans. Following PDMP adoption, the update committees will work with agencies and departments within their respective jurisdictions to align mitigation actions in the PDMP to these policies, plans, and regulations, some of which are identified earlier in this document. Grand County believes that this process will allow the plan to effectively address the hazard mitigation requirements within the planning area and incorporate input from a broad cross section of stakeholders, including community members.

PLAN ADOPTION

Grand County and jurisdictions represented by this document will adopt the Plan according to this general process:

- Posting of the draft plan with public notice to allow community members to review and comment on the plan prior to adoption
- A first reading as part of the Board of County Commissioners meetings or the Town Council meetings, whichever venue is appropriate
- A second reading as part of the Board of County Commissioners meetings or the Town Council meetings, whichever venue is appropriate
- Final adoption by the respective jurisdiction with execution by the proper jurisdiction officials

The public posting of the draft Plan will occur using an Internet (web) posting along with distribution of the draft to public sites such as libraries and government offices. Announcements of the public postings will be made through local newspapers and using Grand County's website.

Every five years, the updated plan will be re-submitted for adoption following the general process outlined above.

Appendix A – Mitigation Actions for Grand County

This appendix describes mitigation actions and associated goals and objectives for the prioritized hazards adopted by Grand County and the participating jurisdictions (Towns of Granby, Hot Sulphur Springs, Fraser, Grand Lake, Kremmling and Winter Park) within Grand County. The hazards identified for mitigation include:

- Wildfire
- Winter Storms
- Transported Hazardous Materials (HAZMAT – Transported)
- Landslide/Rockslide
- Disease Outbreak

The mitigation actions listed below are functional in nature and are actions intended for Grand County and its municipal partners as a whole. Each community is aware that they can only apply for funding for which it is eligible. As Grand County is a rural/frontier area, the actions, many of which are dependent on funding, will be coordinated between the county and the specific municipality it affects at the time of anticipated implementation. Projects in Grand County are typically collaborative due to the limited resources of each individual entity. As the project affects an entity, cooperative plans are made for the collaboration. (For example, Wildfire Objective 3, Mitigation Action 3.4, below, is “Develop and implement fuel-reduction projects”. Multiple fuel-reduction projects are in progress, coordinated with the Grand County Division of Natural Resources, several Community Wildfire Protection Plans, towns, Homeowner’s Associations and federal partners). Such actions are not limited to just an individual jurisdiction, therefore the actions below are encompassing for all partners associated with the development of this plan making the neighboring projects collaborative in order to be most effective.

Wildfire		
Goal	Reduce wildfire occurrences and severity on Grand County	Priority
Objective 1	Improve emergency response capability for wildfire within the planning area	
Mitigation Action 1.1	Identify then certify all privately owned bridges with load limits to support emergency response	Medium
Mitigation Action 1.2	Acquire 4-wheel drive pumper trucks	Medium
Mitigation Action 1.3	Have County staff certified by the National Wildfire Coordinating Group	High
Objective 2	Enhance community policies and procedures as preventive measures to reduce wildfire impact	
Mitigation Action 2.1	Adopt the proposed County-wide Wildfire regulations	High
Mitigation Action 2.2	Strengthen and formalize oversight and enforcement for compliance to land use standards (H.B. 1041)	Low
Mitigation Action 2.3	Implement code changes so that new developments have dual ingress / egress to support emergency response and evacuation	Medium
Mitigation Action 2.4	Develop, implement and promote subdivision wildfire protection protocols	Medium

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Objective 3	Reduce the wildfire threat to critical infrastructure, including residential and commercial property	
Mitigation Action 3.1	Develop and implement a voluntary wildfire protection program for residents within wildfire / urban interchange	High
Mitigation Action 3.2	Develop and implement fuel-reduction projects	High
Mitigation Action 3.3	Identify high risk critical structures within the wildland / urban interchange and develop fire protection strategies appropriate for those structures	High
Mitigation Action 3.4	Develop and implement fuel-reduction projects	High

WINTER STORM

Winter Storm		
Goal	Minimize the impact of Winter Storms on Grand County and participating jurisdictions within the County	Priority
Objective 1	Improve emergency response capability for winter storm response within the planning area	
Mitigation Action 1.1	Identify and improve bridges within the planning area that are inadequate for emergency response	Medium
Mitigation Action 1.2	Incorporate GIS layer for Land-Ownership Parcels into emergency-response procedures	Low
Objective 2	Improve early notification capabilities for Winter Storm events	
Mitigation Action 2.1	Establish Storm Ready Programs, adapted for Winter Storms, within the County (see link below)	Medium
Mitigation Action 2.2	Expand radio coverage within the counties to better support the All Hazard warning / alert system (NOAA weather alert system)	Low

HAZMAT TRANSPORTED

HAZMAT - Transported		
Goal	Reduce the potential for impact from transported hazardous materials to the public the County participating jurisdictions	Priority
Objective 1	Improve public / private response capabilities for hazmat incidents	
Mitigation Action 1.1	Conduct a survey in selected business parks to identify use , storage and transportation of hazardous materials	High
Mitigation Action 1.2	Update and validate previously completed assessments of the quantity and frequency for transported petroleum products in incorporated areas within the County	Medium
Mitigation Action 1.3	Distribute results of the petroleum assessments to all relevant stakeholders, particularly FD's	Medium
Mitigation Action 1.4	Conduct commodity flow studies of main highways and railroads through the county.	High
Objective 2	Identify and characterize facilities and companies that regularly receive or transport hazardous material	
Mitigation	Plan and execute Hazmat exercises, including private	High

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Action 2.1	stakeholders identified in the surveys (see Objective 1)	
Mitigation Action 2.2	Create a county-wide HazMat response plan	High
Mitigation Action 2.3	Coordinate county-wide HazMat response resources	Medium
Mitigation Action 2.4	Conduct HazMat training to bring all responders to the "Operations" level	High
Objective 3	Improve public education of Hazardous Materials transportation, emergencies and response.	
Mitigation Action 3.1	Provide community awareness education classes/ seminars/ advertising/ brochures/ etc...	High

ROCKSLIDE / LANDSLIDE

Landslide/Rockslide		
Goal	Reduce the rockslide occurrences and impact potential on human life and safety and critical services within the County and participating jurisdictions	Priority
Objective 1	Improve emergency response capability for landslide response within hazard areas	
Mitigation Action 1.1	Verify, and provide as necessary, dual ingress / egress in landslide hazard areas to support emergency response and evacuation	High
Mitigation Action 1.2	Implement warning and alert systems with specific coverage of the hazard areas	High
Mitigation Action 1.3	Prioritize wildfire mitigation in Landslide hazard areas to improve secondary impact of Landslide following a wildfire	High
Mitigation Action 1.4	Implement, if necessary, and publicize emergency shelters for use immediately following a landslide event	Low
Mitigation Action 1.5	Organize local Landslide committees with regular meetings to prioritize needs, make recommendations, etc.	Low
Objective 2	Enhance community policies and regulations as measures to reduce impact from landslide	
Mitigation Action 2.1	Improve oversight and enforcement of HB 1041	Low
Mitigation Action 2.2	Implement 'overlay zoning' provisions to minimize development in high risk areas	Medium
Mitigation Action 2.3	Establish Special planning Districts for Landslide hazard areas	Medium
Mitigation Action 2.4	Expand use of risk assessment to guide future land use and policy formation	Medium
Mitigation Action 2.5	Review and implement or update as necessary Building and Grading codes in the hazard areas	Medium
Mitigation Action 2.6	Review and implement or update as necessary Land Use Regulations	Medium
Mitigation Action 2.7	Develop public awareness programs to notify stakeholders in hazard areas of policies and regulations in the areas	High
Objective 3	Improve identification and characterization of landslide hazards	
Mitigation Action 3.1	Improve mapping in the hazard areas and incorporate results into GIS	High
Mitigation	Create or update as necessary maps useful planning and	High

Grand County Pre-Disaster Mitigation Plan

Action 3.2	public, including landslide inventories, landslide-susceptibility maps and landslide hazard maps	
Mitigation Action 3.3	Conduct a planning session with the CGS, CDOT and Dept. of Natural Resources to identify and prioritize Landslide mitigation techniques relevant to the planning area	High
Objective 4	Improve physical mitigation actions for high risk landslide hazard areas	
Mitigation Action 4.1	Review high and medium risk landslide hazard areas and evaluate and prioritize for physical mitigation systems	High

DISEASE OUTBREAK

Disease Outbreak		
Goal	Reduce disease outbreak occurrences and severity in Grand County	Priority
Objective 1	Improve emergency response capability for Disease Outbreak defense within the planning area	
Mitigation Action 1.1	Identify county areas with most vulnerable segments of the population such as the elderly, the very young and overseas visitors.	High
Mitigation Action 1.2	Ensure Emergency responders and other County staffs receive appropriate training in Disease Outbreak issues.	High
Mitigation Action 1.3	Consider formalizing a warning system that includes Disease Outbreak. Potential outlets include newspapers, the county website, radio, television and reverse 911.	High
Mitigation Action 1.4	Update Mutual Aid Agreements, especially with other Northwest Region counties.	High
Mitigation Action 1.5	Determine who receives priority vaccinations in Grand County.	Low
Mitigation Action 1.6	Ensure an adequate county work force is available in the event of a Disease Outbreak	Medium

Disease Outbreak		
Objective 1	Develop educational programs and County initiatives to prevent Disease Outbreak	
Mitigation Action 2.1	Enhance awareness and preparedness in the county through a concerted effort. Adapt existing educational and preparedness materials from various sources to Grand County's needs.	High
Mitigation Action 2.2	Consider a local ordinance that requires appropriate health testing of foreign workers.	Low
Mitigation Action 2.3	Stockpile vaccines. Currently no adequate refrigerated facility exists to handle the county's needs.	Medium
Mitigation Action 2.4	Assign to one county official the duty of monitoring the availability of funds from all sources for the purposes of planning, prevention, and purchasing needed supplies or equipment.	Medium

Appendix B – Pubic Survey Risk Assessment

Grand County surveyed residents to collect public input on risks from natural and human-caused hazards within the participating jurisdictions. This survey was accessible electronically through the Internet and in hardcopy form distributed at certain public buildings within Grand County.

Results from this survey are listed in the tables below. This information was used to guide Grand County PDM planning efforts. Grand County will not necessarily, however, invest mitigation resources according to the priority assigned to these hazards as a result of this survey. In some cases, mitigating activities will not produce adequate benefits compared to implementation and maintenance costs. This survey was used, however, to provide general guidance to planning activities related to Grand County PDMP initiative.

Total No. of Respondents	165
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The hazards below were ranked on a scale of 1 to 10, with 10 describing hazards with the most impact on Grand County. The values shown represent the average ranking for each hazard from all respondents. Highlighted hazards indicate those the Planning team elected to prioritize for remediation in this plan. Emergency responders were asked to identify themselves as part of the survey, and this class of survey respondent comprised approximately 50% of the survey takers.

Grand County Pre-Disaster Mitigation Plan



Survey Date: October, 2005

Pre-Disaster Mitigation Plan Survey - Summary of Survey Results

Jurisdiction	No. of Respondents	Natural Hazards													Human-Caused Hazards														
		Wildfire	Storm	Flood	Flash Flood	Landslide	Avalanche	Drought	Tornado	Winds	Lightening	Earthquake	Disease Outbreak			Dam Breach	International Terror	Domestic Terror	Haz Mat Transportation	Fixed Installations of Hazardous Materials	Urban Fire (Accidental)	Airplane Crashes	Military Accident	Arson	Extreme Acts of Violence	Civil Disturbance	Motor Vehicle Crashes (Multiple)	Extreme Acts of Violence	Jail Escape
Unincorporated County	63	9.16	7.16	4.11	3.54	4.25	5.67	6.41	1.59	5.29	5.71	2.52	4.46		4.40	3.46	4.02	6.08	3.87	5.38	3.49	2.22	4.30	3.84	3.21	6.33	6.60	2.90	
Fraser	5	6.2	4.6	3.6	4	3.4	4.2	6.8	1.6	6	6.8	2.6			4.2	4.2	6	9.4	6	7.4	5.4	3.8	5.8	6.6	5	6.4	6.4	3.6	
Winter Park	25	7.72	7.48	3.8	4	3.64	4.32	6.96	2.12	5.76	5.6	2.52	5.48		5.08	3.21	4.17	6.58	3.71	4.96	4.5	2.5	3.5	4.08	3.54	7.08	7.38	2.71	
Granby	10	9.2	6.3	3.8	4.2	4.4	5.3	6.4	2.1	4.3	6	2.7	4.57		4.8	4.2	4.3	7	5.8	6.8	3.8	3.2	4.3	5.1	3.7	6	7.4	2.7	
Kremmling	11	7.36	6.64	3.00	3.09	4.45	4.09	5.00	1.00	5.00	5.91	2.18	4.67		3.36	1.91	2.91	4.73	3.55	4.64	3.00	2.45	3.45	3.36	3.09	4.45	5.00	2.27	
Hot Sulphur Springs	9	9.33	6.78	4.44	5.11	5.89	5.33	6.00	2.00	4.89	5.33	3.33	6.5		4.89	3.33	3.33	6.22	4.56	6.33	3.67	2.22	5.78	4.67	3.78	5.78	6.00	3.56	
Grand Lake	27	8.48	6.19	3.30	3.59	3.30	4.56	5.37	1.44	5.33	5.70	2.93	4.78		4.78	3.04	3.96	5.52	4.07	5.56	4.07	2.78	4.74	4.59	3.15	6.22	6.44	2.78	
Totals / Weighted Averages	150	8.6	6.8	3.8	3.7	4.1	5.0	6.2	1.7	5.3	5.7	2.6	4.7		4.6	3.3	4.0	6.1	4.1	5.5	3.8	2.5	4.3	4.2	3.4	6.2	6.6	2.9	
Rank Natural Hazards		1	2	9	10	8	6	3		5	4	11	7																
Rank Man-Made Hazards															5	12	9	3	8	4	10	14	6	7	11	2	1	13	
Rank Overall		1	2					4			6							5		7							3		

Ranking Scale	1	2	3	4	5	6	7	8	9	10	11	12	13
	Highest Perceived Risk												Lowest Perceived Risk
	Moderate Perceived Risk												

Grand County Pre-Disaster Mitigation Plan

The following represents the public survey form used to collect the public input.



Grand County, Colorado

Pre-Disaster Mitigation Plan Development

Public Survey

Introduction

Grand County is participating in a federally-funded effort in accordance with the Disaster Mitigation Act of 2000 to develop a **pre-disaster mitigation plan** to reduce risk from natural and human-caused hazards. The input of all County residents is sought through this public survey about possible hazards facing the County. **The survey is available electronically through the Grand County website and in paper form in libraries, town halls and the County courthouse in Hot Sulphur Springs.**

Your participation in this short survey is greatly appreciated and will contribute to the quality of the County's emergency planning efforts.

The survey will be available from OCTOBER 20TH through NOVEMBER 2ND, 2005

Respondent Name: _____

Are you 18 years old or older: (YES NO)

Please record today's date: DATE: / / 2005

If you reside in a town, which one? _____

Do you reside in unincorporated
Grand County? (YES NO)

Are you an Emergency Response Professional? (YES NO)

If so, are you a (check those that apply):

Firefighter _____

Law enforcement _____

EMS _____

Healthcare professional _____

Mountain Rescue _____

Other public safety _____



Multi-Jurisdictional Hazard Mitigation Plan Development

Public Survey Form

In your opinion, which of the following hazards and their potential consequences most threaten life, health and property in your community?

Please rate each hazard from 1 – 10

1 – Least threatening
10 – Most threatening

Natural Hazards

(Please circle your responses)

Wildfire	1	2	3	4	5	6	7	8	9	10
Winter Storm	1	2	3	4	5	6	7	8	9	10
Seasonal Flooding (seasonal rains, melting snow)	1	2	3	4	5	6	7	8	9	10
Flash Flooding (caused by high run-off due to excessive rain and drainage failure)	1	2	3	4	5	6	7	8	9	10
Landslides	1	2	3	4	5	6	7	8	9	10
Avalanche	1	2	3	4	5	6	7	8	9	10
Drought	1	2	3	4	5	6	7	8	9	10
Tornado	1	2	3	4	5	6	7	8	9	10
High Winds	1	2	3	4	5	6	7	8	9	10
Lightning/Thunderstorms	1	2	3	4	5	6	7	8	9	10
Earthquake	1	2	3	4	5	6	7	8	9	10

Human-Caused Hazards

(Please circle your responses)

Flood due to Dam Breach	1	2	3	4	5	6	7	8	9	10
International Terrorism	1	2	3	4	5	6	7	8	9	10
Domestic Terrorism	1	2	3	4	5	6	7	8	9	10
Transportation of Hazardous Materials	1	2	3	4	5	6	7	8	9	10
Fixed Installations of Hazardous Materials	1	2	3	4	5	6	7	8	9	10
Urban Fire (Accidental)	1	2	3	4	5	6	7	8	9	10
Airplane Crashes	1	2	3	4	5	6	7	8	9	10
Military Accident	1	2	3	4	5	6	7	8	9	10
Arson	1	2	3	4	5	6	7	8	9	10
Extreme Acts of Violence (e.g. Granby incident)	1	2	3	4	5	6	7	8	9	10
Civil Disturbance	1	2	3	4	5	6	7	8	9	10
Motor Vehicle Crashes (single vehicle)	1	2	3	4	5	6	7	8	9	10
Motor Vehicle Crashes (multiple vehicles)	1	2	3	4	5	6	7	8	9	10
Jail Escape	1	2	3	4	5	6	7	8	9	10

Other Hazards – Natural or Human-caused (please write in relevant hazard)

	1	2	3	4	5	6	7	8	9	10
	1	2	3	4	5	6	7	8	9	10
	1	2	3	4	5	6	7	8	9	10

Appendix C – STAPLEE Sample Template

The following table is an example of the STAPLEE template used by the planning team to validate mitigation actions encompassed by this Plan. Each planning team member assessed each potential action item individually. The assessment for each criterion (consideration) was defined by:

(-) negative response - indicates that the criteria would have a negative impact on the adoption of the associated mitigation action.

(0) neutral response - indicates that the criteria would have a neutral impact on the adoption of the associated mitigation action.

(+) positive response - indicates that the criteria would have a positive impact on the adoption of the associated mitigation action.

The results of the STAPLEE analysis are available through the respective Grand County emergency management coordinators.

HAZARD	Avalanche
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GOAL 1	Reduce impact on life, safety and property from avalanche.
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Ranking Criteria Considerations ----> For Alternative Actions — — ∨	Social		Technical			Administrative			Political			Legal			Economic				Environmental				
	Community Acceptance	Effect on disadvantaged population segment	Technical Feasibility	Long Term Solution	Secondary Impacts	Staffing	Funding Allocation	Maintenance and Operations	Political Support	Local Champion	Public Support	State Authority	Existing Local Authority	Potential Legal Challenge	Benefit of Action	Cost of Action	Contributes to Economic Goals	Outside Funding Required	Effect on Land / Water	Effect on Endangered Species	Effect on HAZMAT / Waste Sites	Consistent with Community Environ. Goals	Consistent with Federal Laws
Objective 1 Improve emergency response capability for avalanche response within hazard areas																							
1.1. Provide additional training for emergency response staff (Mountain Rescue) using American Avalanche Training curriculum	+	+	+	+	+	0	-	0	+	+	+	+	+	+	+	+	+	-	0	0	0		
1.2 Organize and fund a committee to evaluate cost / benefit / impact of RECCO technology deployment for location and recovery of victims																							
1.3.																							
1.4																							

[illegible][illegible]

Appendix D – Risk Assessment Data Collection Template

For each jurisdiction participating in Plan development, a risk assessment was conducted for the hazards prioritized as a result of the public survey and expert input. Project participants completed a risk assessment tool, an example of which is listed below. The results of this risk assessment were used to rank hazards according to high, medium, or low risk as illustrated in the Risk Assessment section of this Plan.

Risk Assessment Template

Note: This document assesses impact of hazard on community. List all probable incidents for all hazard types.
This spreadsheet uses a qualitative scoring model. Pointing the cursor over the table header cell (red dot) gives the scoring criteria for assessment.

Natural Hazard: Wildfire								
Location	% Chance of Hazard Event	Potential Magnitude	Impact to Life and Health	Impact to Property	Economic Impact	Impact to Infrastructure and Critical Facilities	Impact to First Responders	Total Score

A description of the criteria and scoring for this risk template is listed on the following page.

Hazard Risk Criteria	Description	Scoring Metrics
Location	Geographic location (i.e., 120 square miles in north-east part of county, coordinates of location etc.)	Not applicable
Potential Magnitude	What are loss expectations for life and safety? What is the severity of the hazard? This might require Historical data, hazard maps, expert judgment.	5% - 1 event in 20 years 20% - approx. 2 events in 10 yrs. time 100% - one event in any year 200% - two events in any year
Impact to Life and Health	What are loss expectations for life and safety?	5 - Catastrophic: more than 50% area / population/ infrastructure affected, 4 - Critical: 25% - 50%, 3 - Medium: 10% - 25%, 2 - Low: less than 10% affected 1 - Negligible affect
Impact to Property	What are loss expectations for property?	1 - Low (Less than 5% of affected area population or maximum of 5 people affected) 2 - Moderate (between 5% - 10% of affected area population or maximum of 20 people affected) 3 - High (between 10% - 20% affected or maximum of 50 people affected) 4 - Extreme (more than 20% or over 50 people directly affected)
Economic Impact	Includes losses to commercial revenues, tourism, etc. Losses include direct revenues and opportunity losses such as downtime.	1 - Low (Less than \$10,000 losses on local economy/businesses) 2 - Moderate (more than \$10,000 but less than \$50,000) 3 - High (expected losses more than \$50,000 and less than \$200,000) 4 - Extreme (expected losses more than \$200,000)
Impact to Infrastructure and Critical Facilities	Impact includes service disruption, structural damage, displacement costs, etc.	1 - Low (expected damages less than \$50,000) 2 - Moderate (expected damages between \$50,000 - \$500,000) 3 - High (between \$500,000 - \$ 1 MM) 4 - Extreme (in excess of \$ 1 million)
Impact to First Responders	Impact includes affect on operational efficiency, equipment or personnel	1 - Low (less than 5% loss of operational efficacy) 2 - Moderate (5% - 10% loss in efficacy) 3 - High (10% - 20% loss in efficacy) 4 - Extreme (more than 20% loss of operational effectiveness)

Appendix E – References used in Plan Development

The below resources were consulted during plan development. Additional references are cited throughout this plan.

General reference resources

Grand County (www.grand-county.com)

State of Colorado/Department of Local Affairs

The Denver Post

The Rocky Mountain News

Federal Emergency Management Agency

Northwest Colorado Council of Governments

Colorado State University

US Census Bureau

The Wilderness Society

E-Podunk.com

Wikipedia.org

US Department of Agriculture, Forest Service

General Hazard References and Plans

<http://www.colorado.edu/hazards> (re natural hazards)

Natural Hazards Risk Assessment for the State of Colorado Fall, 2004

Colorado State Hazard Mitigation Plan, 2004

http://www.fema.gov/fema/approved_plans_reg8.shtm (approved plans in Region 8)

Specific Hazards and Referenced Materials

Airplane Crashes

McElroy Airfield (<http://www.airnav.com/airport/20V>)

Federal Aviation Administration

Aviation International News

National Transportation Safety Board

Arson

Colorado Department of Public Safety, Division of Fire Safety

US Department of Treasury, Bureau of Alcohol, Tobacco and Firearms

State of Georgia, Office of Secretary of State

National Criminal Justice Reference Service

Asteroids

"The Threat of Impact by Near-Earth Asteroids", by Dr. Clark R. Chapman, Southwest Research Institute, before the Subcommittee on Space and Aeronautics of the Committee on Science of the U.S. House of Representatives at its hearings on "Asteroids: Perils and Opportunities", May 21, 1998.

National Aeronautics and Space Administration

Avalanches

Snow Avalanche Hazards and Mitigation in the United States, Committee on Ground Failure Hazards Mitigation Research, National Research Council

Colorado Geological Survey - Colorado Avalanche Information Center

Avalanche.org

The Avalanche Center

Disease Outbreak

Center for Disease Control

State of Colorado, Department of Public Health and Environment

Drought

Colorado Drought and Mitigation Response Plan, January, 2001

Economic Impact of Drought, April, 2002

Earthquakes

Colorado Geological Survey

US Geological Survey Earthquakes Hazard Program

National Earthquake Hazards Reduction Program

Extreme Acts of Violence

cbs4denver

Newspapers and Technology

Flooding

National Oceanic and Atmospheric Administration

National Weather Service – Central Region Headquarters

HAZMAT

Colorado Department of Emergency Management

Colorado Department of Public Health and Environment

Colorado State Patrol

US Department of Transportation

Federal Motor Carrier Safety Administration

High Winds/Tornado

National Weather Service – Central Region Headquarters

Landslides

Federal Emergency Management Agency/Landslides

Lightning and Thunder

National Weather Service – Central Region Headquarters

Military Accidents

CNN

Jail/Prison Escapes

State of Colorado, Department of Corrections

Terrorism

US Department of Justice

Federal Bureau of Investigation

US Code of Federal Regulations

Urban Fire

East Grand Fire District

Vehicle Crashes

Colorado State Patrol

US Department of Transportation

Colorado Department of Transportation

National Highway Traffic Safety Administration

Volcanoes

US Geological Survey

TheDenverChannel.com/7News

Wildfires

www.coloradoan.com/apps/pbcs.dll/article?AID=/20051004/NEWS01/510040303/1002/NEWSLETTER (re pine beetle)

www.colostate.edu/Depts/CSFS/csfs02anrept.pdf (2002 Report on the Health of Colorado's Forests - re pine beetle)

www.colostate.edu/Depts/CSFS/redzone.html (Fire map)

Colorado State Forest Service compiled a Wildland Urban Interface (WUI) Hazard Assessment in 2001 and 2002

Science Basis for Changing Forest Structure to Modify Wildfire Behavior and Severity U.S. Department of Agriculture Forest Service, April 2004

Colorado Department of Public Safety, Division of Fire Safety, 2005 Fire Service Profile

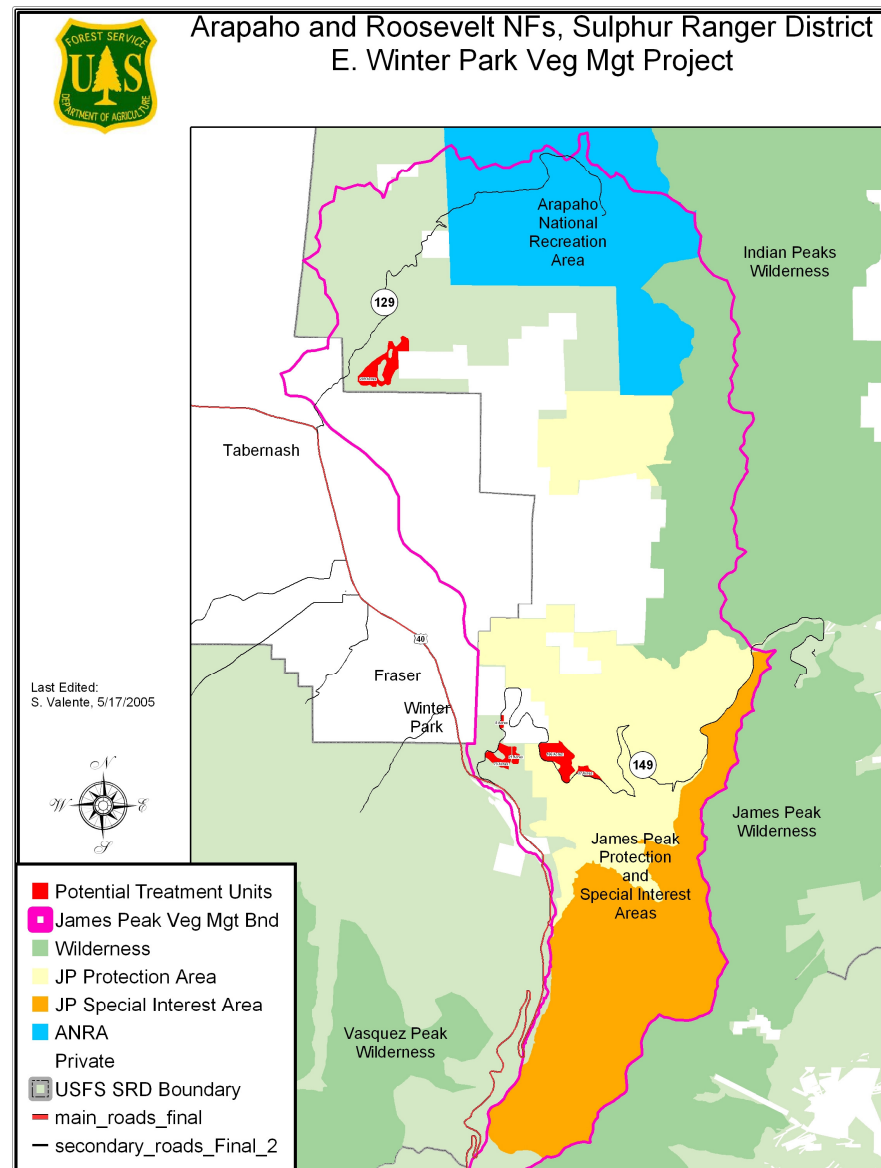
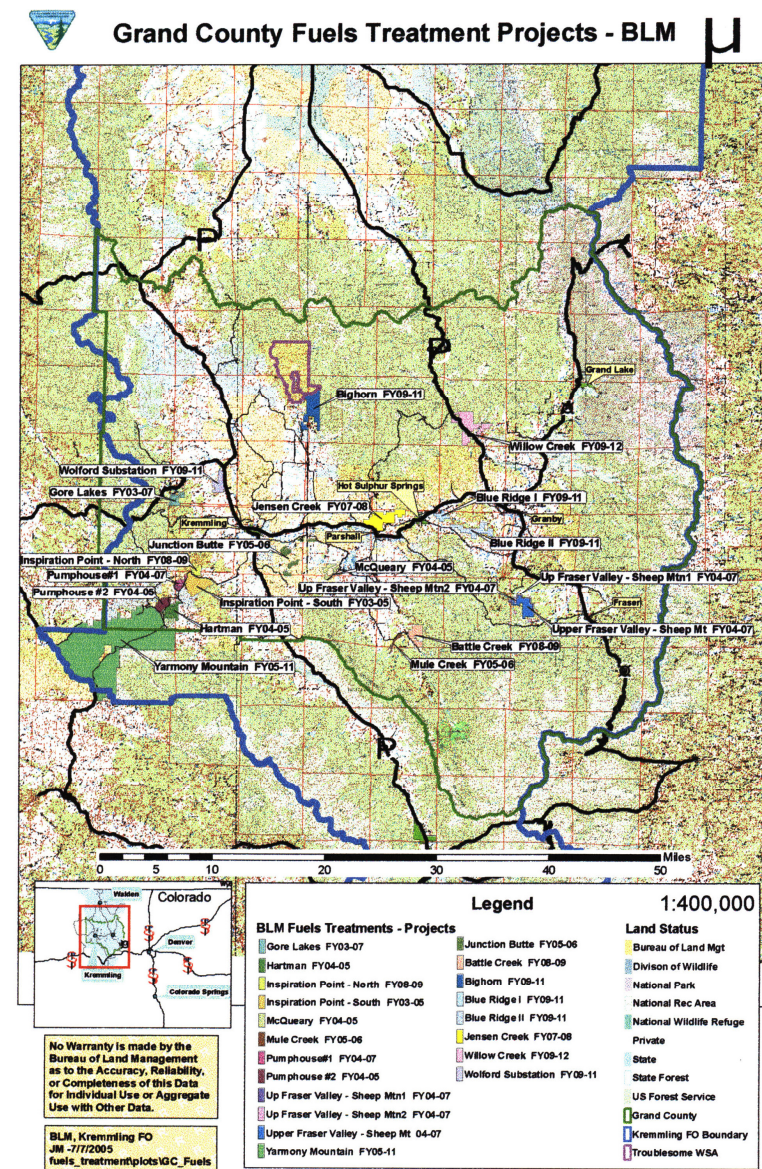
Winter Storms

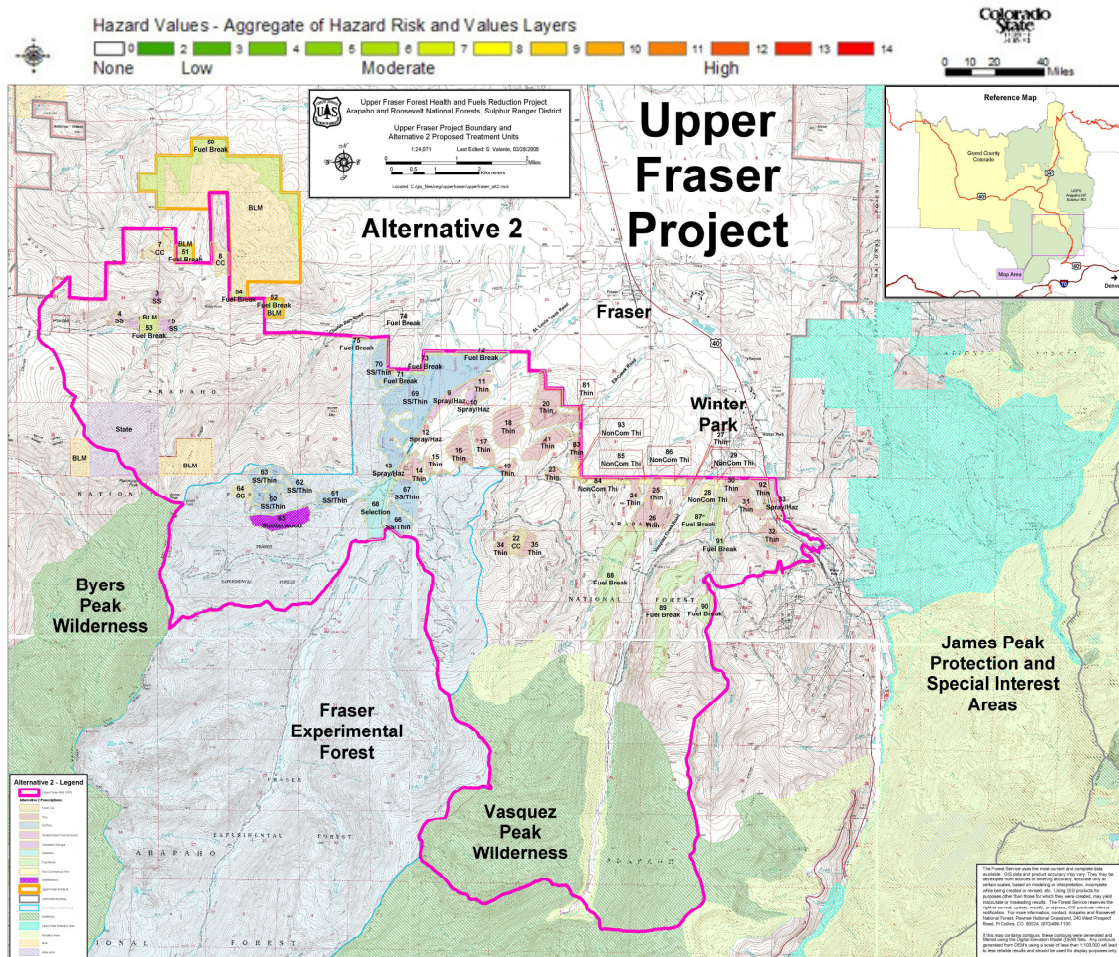
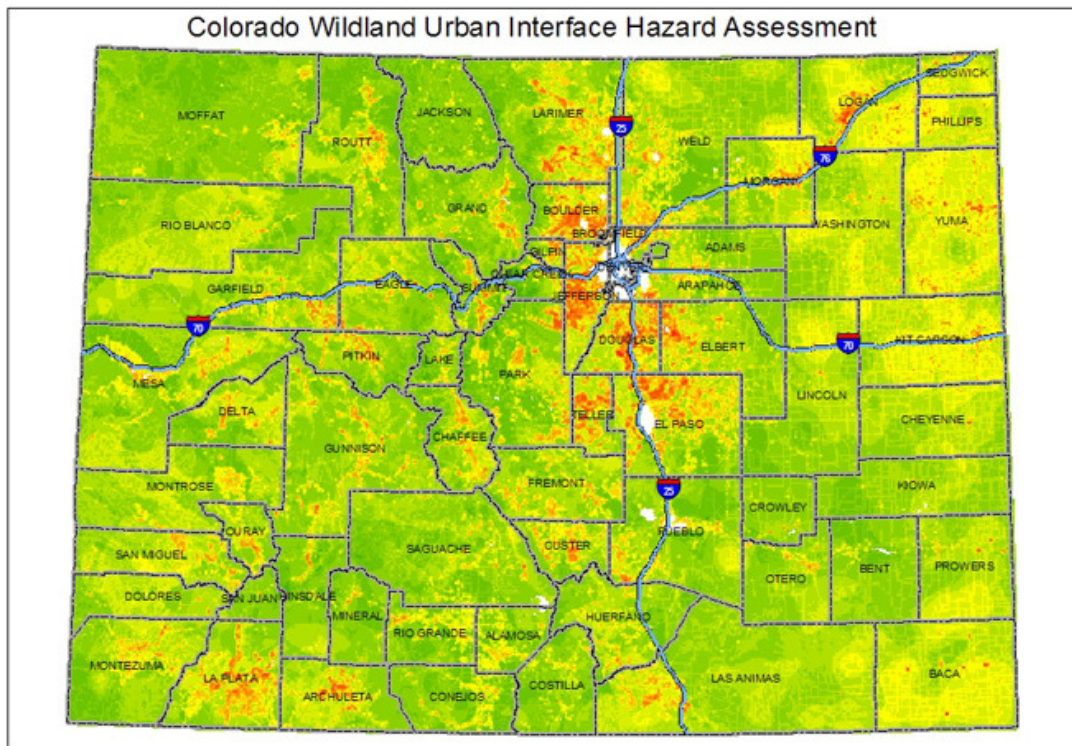
Colorado Department of Local Affairs

National Weather Service

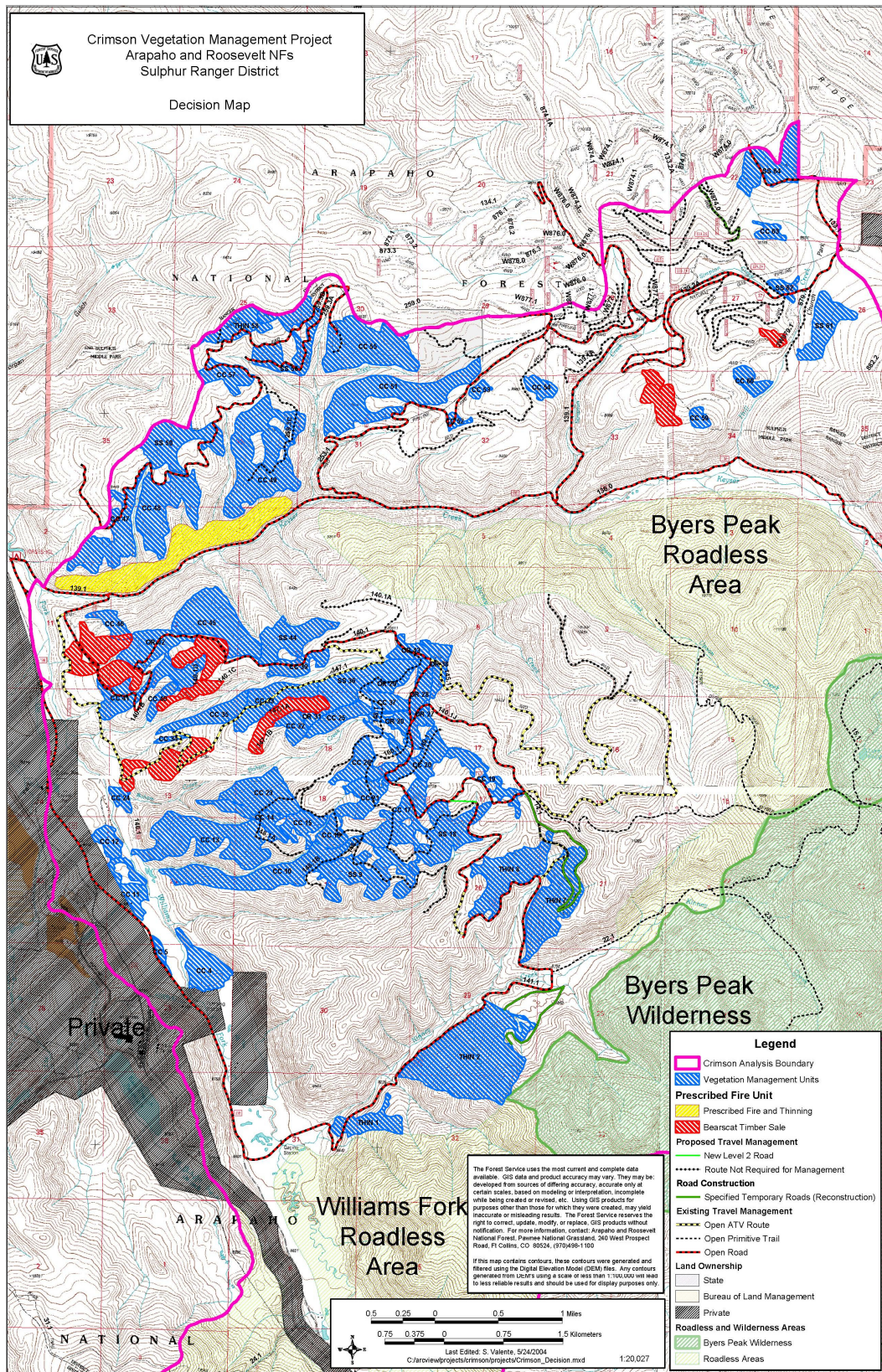
U.S. Department of Transportation, Bureau of Transportation

Appendix F – Hazard Maps





Grand County Pre-Disaster Mitigation Plan



Appendix G – Grand County Wildfire Plan, Draft

As of December 2006, the Grand County Wildfire Plan has been completed. This Wildfire Plan provides important input to the wildfire hazard section of this PDMP. For the complete text of the Grand County Wildfire Plan, please contact the Grand County Emergency Management Coordinator.